DOCUMENT RESUME

ED 266 317 CE 043 633

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TITLE	Analysis of Students' Basic Skills Performance in Selected Instructional Delivery Systems: Final Report.
INSTITUTION	Ohio State Univ., Columbus. National Center for Research in Vocational Education.
SPONS AGENCY	Office of Vocational and Adult Education (ED), Washington, DC.
PUB DATE	Jan 86
CONTRACT	300-83-0016
NOTE	298p.
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01/PC12 Plus Postage.
DESCRIPTORS	Academic Achievement; *Basic Skills; Classroom Environment; *College Preparation; Comparative Analysis; Cooperative Education; *Delivery Systems; Demography; *Educational Environment; *General Education; Interviews; Outcomes of Education; Personality Traits; Questionnaires; Secondary Education; Skill Development; Study Habits; Teaching Methods; *Vocational Education

ABSTRACT

A study examined various characteristics of learning environments that promote or retard the development of basic skills proficiency. Data on four school programs--vocational noncooperative, vocational cooperative, general education, and college preparatory--were collected in a repeated measure design via observations, testing, and interviews. A total of 360 observations of each of the four programs at six different schools were conducted. The data collected indicated that all four educational programs examined have something to learn from the others. It was recommended that vocational programs increase (1) both the exposure to and the level of reading skills required for vocational students; (2) the demand for the level of mathematics skills that students use in completing tasks; (3) students' involvement and intensity with activities requiring the use of data; and (4) students' opportunities for autonomy, self-direction, and feedback. Vocational educators were also urged to create a more caring and supportive learning environment to help students perceive vocational education classes more positively. (Appendixes to this report include a detailed report of the student data collected, the student interview form, results from the classroom and work environment scales, a summary of the observational methodology, and an in-depth discussion of the students' basic skills achievement.) (MN)

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ANALYSIS OF STUDENTS' BASIC SKILLS PERFORMANCE IN SELECTED INSTRUCTIONAL DELIVERY SYSTEMS: FINAL REPORT

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CE043633

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January 1986

FUNDING INFORMATION

Project Title: National Center for Research in Vocational Education, Applied Research and Development

Contract Number: 300830016

Project Number: 051OC50010

Act Under Which Funds Administered: Education Amendments 1976, P.L. 94-482

Source of Contract:
Office of Vocational and Adult Education
U.S. Department of Education
Washington, DC 20202

Contractor:
The National Center for Research in Vocational Education
The Ohio State University
Columbus, Ohio 43210-1090

Executive Director: Robert E. Taylor

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FOREWORD

Basic skills deficiencies among youth and even working adults in the United States have been well documented in recent years. The societal and corporate costs of inadequate basic skills preparation are profound. A major problem for educational researchers has been to attempt to characterize the features of learning environments that either promote or retard basic skills acquisition. This study, Analysis of Students' Basic Skills Performance in Selected Instructional Delivery Systems: Final Report, examines student participation in four educational programs and their corresponding environments or settings to determine which situational and demographic variables have an impact on basic skills acquisition. In doing so, the study builds on a previous study that identified possible environmental factors influencing basic skills performance and described patterns of coexposure to those skills and factors.

The intended audience for this report is vocational researchers, policy makers, and counselors. By employing a variety of testing and interview instruments, as well as a specially adapted observation methodology, this report addresses a question with three components: What sort of student learns which basic skill best in what type of educational setting? Through the participation of a midwestern urban public school system, data were collected for a sample of approximately 400 students during the 1984-85 school year. These data measure math and reading performance at three intervals: pretest, midtest (middle of school year), and posttest (end of school year). Student performance was compared across the four instructional programs of college preparatory, general education, noncooperative vocational education, and cooperative vocational education. The data collection methods used include classroom and work site observations, student testing, and interviews.

Many people have spent considerable time and energy on this study. Although the students, teachers, school administrators, employers, and school system that participated in this study must remain anonymous, we sincerely thank them for allowing the observers the freedom to collect the data that were necessary. Special appreciation is extended to Harry F. Silberman, Professor of Education, University of California at Los Angeles, and David Thornton Moore, Director of Social Science Programs, New York University, for their thoughtful review of this report.

This project was conducted in the Development Division of the National Center for Research in Vocational Education under the direction of Harry Drier, Associate Director, and Michael Crowe, Program Director. We also thank James Weber, Senior Research Specialist, and Larry Hettinger, Judith Johnson, and Cynthia Beaulieu, Graduate Research Associates, who helped with the statistical analysis and the writing of this report. Appreciation is extended to Robert MacCallum, Associate Professor of Psychology, The Ohio State University, who served as consultant to the project. We are grateful to Judith Sechler and staff of the National Center's Editorial Services for carefully editing the text and to other members of the National Center staff who provided insights during the study's development. Internal reviews were conducted by Richard Miguel, Senior Research Specialist and Kevin Hollenbeck, Senior Research Specialist. Gratitude also goes to Deborah Black, who provided expert secretarial and word processing support.

The funds for this study were provided by the Office of Vocational and Adult Education, U.S. Department of Education.

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Executive Director
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in Vocational Education

EXECUTIVE SUMMARY

In a survey by the Center for Public Resources (Henry and Raymond 1983), more than 65 percent of responding companies reported that deficiencies in the use of basic skills (e.g., reading comprehension and mathematical computation) were the primary factors limiting the career development of their employees who were high school graduates. The recently released report A Nation at Risk: The Imperative for Educational Reform (National Commission on Excellence in Education 1983) states that approximately 23 million American adults are considered functionally illiterate "by simplest tests of everyday reading, writing, and comprehension" (p. 8). The U.S. Department of Education estimates that on an annual basis, 2.3 million people are added to the ranks of functionally illiterate adults, or those adults unable to read at a sixth-grade level. Of this number, approximately 1 million are teenagers leaving school without functional reading skills, and 1.3 million are non-English-speaking immigrants.

The illiteracy problem is most pronounced among minorities; 56 percent Hispanics and 47 percent black 17-year-olds are functionally illiterate (How Business is Joining 1984, p. 94). Illiteracy and the lack of other basic skills, including oral communication and mathematical computation, have been recognized as a serious barrier to low-income and minority youths' successful entry into the labor market (Corman 1980).

This study focuses on characteristics of learning environments that promote or retard the development of basic skills proficiency. Specifically, this study assesses the environmental factors at school, personality factors such as student demographic characteristics and study habits, and the effect the school program has on the acquisition of basic skills (math and reading). At the same time, an attempt is made to answer the question what type of student learns which basic skill best and in what setting?

Data on four school programs--vocational noncooperative, vocational cooperative, general educators, and college preparatory--were collected, in a repeated measure design via observations, testing, and interviews. These programs emphasized different arrangements for learning.

Objectives for the study are--

- to describe the relationships between students' performance on basic skills at three intervals (pretest, at the beginning of the school year; at the midpoint of the school year; and the posttest, at the end of the year) and their participation in one of four educational/curricular programs (college preparatory, general education, vocational nonco-op, and vocational co-op)* and
- to isolate and describe the major factors that characterize the program environments and that have potential for influencing basic skills acquisition.

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*Students were also tested after the summer break in order to assess their retention of basic skills. These data, however, were not analyzed for this report. The data will be analyzed and reported during the Year IV National Center grant.

The intended audience for this report includes vocational researchers, policymakers, and counselors, as well as vocational planners, curriculum designers, and evaluators concerned with secondary education. Specifically, this study's findings will assist program developers in designing learning experiences to incorporate the environmental factors that increase students' acquisition of basic skills and will contribute to evaluation methodology for assessing program effectiveness.

The research effort focused on an observational method that would describe learning environments in terms of an array of basic skills and attentional and environmental variables. Trained observers made two rounds of observations (a total of 360), the first in the autumn of 1984 and the second in the spring of 1985.

Observers' notes were then divided into "task episodes" (Moore 1981), which are defined as segments of time in which the observed individual's attention remains focused on the completion of a particular task. Behaviors and activities within each task episode were then coded using the definitions of the observational variables and a coding strategy similar to that devised by Halasz and Behm (1983).

The Classroom Environment Scale (CES) (Moos and Trickett 1974), to assess the social climates of junior high and high school classrooms, and the Work Environment Scale (Moos 1981), to measure perception of work environments, were used. At the same time, students participated in an interview that provided demographic information and feelings and attitudes toward school and work. Selected items from the Comprehensive Tests of Basic Skills (CTBS) and the National Assessment of Educational Progress (NAEP) were administered at the three indicated testing times in order to measure basic skills achievement

Results from this study were categorized as follows: characteristics of students, skill demands in the learning environments, students' perceptions of their learning environments, and initial examination of the relationship between students' basic skill achievement and educational programs. These initial findings are based on a series of hierarchical regression models.

The number of students interviewed for each program is as follows: 84 college preparatory; 58 general education; and 239 vocational nonco-op and co-op. Although vocational students had not been exposed to areas such as mathematics, English, science, social studies, and foreign languages to the same extent that college preparatory students had, in many cases they had received more exposure than general education students. Approximately 50 percent of the college preparatory students described their grades as Bs or better, compared to 27.7 percent of the vocational and 8.7 percent of the general education students. On the whole, the college preparatory students reported watching television less and spending more hours per week on homework than did general or vocational students. Vocational students spent a proportionally greater amount of time in work situations than students in other school programs.

This study's findings indicate the following concerning skill demands in the learning environments:

- Regarding the basic skills factors that measured the differential patterns of exposure to and levels of basic skills, it appears that--

  --language arts skill demands (except for speaking) are lower for vocational students than college preparatory students.

  --speaking skill demands are higher for vocational students than for academic students. The vocational co-op work site requires the highest level of speaking skills.

  --vocational students have a higher exposure to, but lower level of, mathematic skill demands than do academic students. Vocational programs, especially at the work site, require a greater exposure to mathematics skills than academic programs do.

- Regarding the attentional factors that assessed students' level of cognitive involvement with data, people, and things, it appears that--

  --data demands are lower for vocational students than for academic students. Although the exposure to data requirements is essentially the same for all students, vocational programs, especially at the work site, require the lowest data skills levels.

  --the level of involvement with people skills is greatest in the vocational nonco-op and co-op work site programs. Vocational nonco-op requires the highest frequency of involvement with people, and the vocational co-op work site requires the highest level of people skills.

  --demands for involvement with things are higher for vocational students than for academic students. Vocational programs, especially the work site component, had greater exposure to and level of involvement with things than academic programs.

- Regarding environmental factors that assessed the characteristics of the settings related to the enhancement of basic skills, it appears that--

  --the learning environments of vocational co-op work site students is far more complex than that of students in vocational or academic classrooms. Co-op students at the work site performed significantly more tasks necessary for others to carry out their own work than did classroom-based students. Co-op students in class and at the work site performed more self-initiated tasks than college preparatory and general studies students whose tasks were more teacher directed. Co-op students at the work site were required to carry out the widest variety of tasks and cope with the most interruptions in coordinating tasks but encountered the lowest number of simultaneous tasks.

--vocational students had less autonomy, self-direction, and feedback in carrying out their tasks than did academic students. Vocational programs, especially in the classroom, provided significantly lower autonomy in task execution than academic programs. Vocational programs, especially at the work site, engaged students in more highly prescribed tasks than academic programs did. The vocational co-op classroom component provided less feedback than college preparatory (the highest), general studies, and the vocational work site component.

The Classroom Environment Scale (CES) was administered to the following numbers of students: 83 college preparatory; 105 general education; 89 vocational nonco-op; and 48 vocational co-op. Of the 163 students who completed the Work Environment Scale, 120 more vocational co-op students with school-sponsored jobs and 43 were students in other programs holding non-school-related part-time jobs.

The findings regarding students' perceptions of their learning environments are as follows:

- Vocational co-op students perceived their classrooms as being lower on affiliation than did college preparatory students.
- College preparatory and vocational nonco-op students perceived their classrooms as being higher on teacher support than did vocational co-op students.
- College preparatory students perceived their classrooms as being higher on order and organization than did vocational co-op students.
- Vocational nonco-op students perceived their classrooms as being higher on teacher control than did college preparatory students.

- Vocational co-op students perceived their work environments as being higher on involvement than did students who held part-time jobs not related to school.

An initial examination of the relationship between students' basic skill achievement and educational programs has led to the following general findings:

- Overall for students as a group (across settings), both mathematics and reading achievement (1) increased slightly from the fall to winter testing and then (2) decreased from the winter to spring testing.
- No consistent relationships exist between the selected demographic characteristics and basic skills achievement.
- Grade level is negatively related to the changes in both mathematics and reading achievement observed from winter to spring.
- The most consistent relationship existing between the other student characteristics and basic skills achievement involves the students' current marks in school.
- The school in which students are enrolled is very critical to basic skills achievement.
- Consistent relationships exist between programs and basic skills achievement.
- The effect of classes to which students are assigned, like that noted earlier for schools, is very important to basic skills achievement.

The findings of this study seem to indicate that all educational programs have something to learn from each other about providing basic skills to students. The authors' perspective is that there are multiple pathways for students to acquire basic skills and that students should be encouraged to take advantage of alternative ways to learn basic skills.

Recommendations for vocational programs are as follows:

- Increase both the exposure to and the level of reading skills required for vocational students.

- Increase the demand for the level of mathematics skills that vocational students use in completing tasks.
- Increase the vocational students' involvement and intensity with activities requiring the use of data.
- Increase vocational students' opportunities for autonomy, self-direction, and feedback.
- Create a more caring and supportive learning environment to help students perceive vocational education classes more positively.

Recommendations for academic programs are as follows:

- Increase both the exposure to and the level of speaking skills.
- Increase the opportunities for students to use manipulative skills.
- Diversify these environmental factors in the classroom:

  --variety
  --self-initiation
  --coping with changes in the environment
  --increase the significance of the task for the student

CHAPTER 1

INTRODUCTION

The research contained in this report seeks to address the question of what kind of student learns what type of basic skill best in which type of environment. Through use of a variety of research methods, to be discussed in greater detail in chapter 2, it is the intent of the authors to assess the effects of the school and cooperative workplace environments, and of individual demographic and behavioral factors, on the acquisition of basic skills.

What follows in the current chapter is a brief overview of literature relevant to the problem. It informs the reader of the urgent societal needs for research on the acquisition and retention of basic skills and provides a discussion of earlier approaches to related issues. Since a large part of the current study involves the direct observation of the classroom and workplace environments, particular attention will be paid to earlier studies that employed observational methodologies.

The Problem and the Context

According to a survey of Basic Skills in the U.S. Work Force (Henry and Raymond 1983) by the Center for Public Resources, more than 65 percent of companies responding reported that deficiencies in the use of basic skills (e.g., reading comprehension and mathematical computation) were the primary factors limiting the career development of their employees who were high school graduates. Among the examples of deficiencies reported were instances of clerical workers unable to read at a level required by the job, supervisory-level workers unable to write reports free of mechanical error, and bookkeepers unable to use fractions and decimals in solving math problems.

The U.S. Department of Education estimates that on an annual basis, 2.3 million people are added to the ranks of functionally illiterate adults, defined as those unable to read at a sixth-grade level. Approximately 1 million are teenagers leaving school without functional reading skills, whereas 1.3 million are non-English-speaking immigrants. The recently released report *A Nation at Risk: The Imperative for Educational Reform* (National Commission on Excellence in Education 1983) states that approximately 23 million American adults are considered to be functionally illiterate "by the simplest tests of everyday reading, writing, and comprehension" (p. 8). The illiteracy problem is most pronounced among minorities; 56 percent of Hispanic and 47 percent of black 17-year-olds are rated as functionally illiterate ("How Business is Joining" 1984, p. 94). Illiteracy and the lack of other basic skills, including oral communication and mathematical computation, have been recognized as one of the most serious barriers preventing low-income and minority youths' successful entry into the labor market (Corman 1980).

The societal and corporate costs of inadequate basic skills preparation are profound. According to U.S. Department of Labor estimates, approximately half of those unemployed nationwide are functionally illiterate. The same proportion holds for the National prison population.

Estimates of corporate productivity losses attributed to lack of education in basic skills run into the hundreds of millions of dollars. One company, a middle-sized manufacturer, estimated losses of $250,000 arising from inferior work directly attributable to inadequate proficiency in basic skills ("How Business is Joining" 1984, p. 94).

The problem of basic skills competency also extends into the military (Sticht 1978). Given the accelerating introduction of complex technology into the armed services, the urgent need to guarantee adequate basic skills competency on the part of military personnel is obvious.

According to Bureau of the Census data, demographic trends are indicating a continuous decline in the number of individuals reaching working age in the coming years. Only 3.2 million people will turn 18 in 1992, 40 percent fewer than in the peak year of 1979. At the same time, "occupations requiring little or no basic skills abilities are rapidly disappearing, while newly created occupations require workers to use reading and writing and computation at a fairly high level of skill in the solving of daily problems on the job" (Sticht and Mikulecky 1984, p. 4).

Given the expected future reduction in the number of 18-year-olds and the rapidly accelerating need for improved basic skills proficiency in light of new job requirements, the need for improving basic skills education is obvious. Recent Federal legislation, such as the Job Training Partnership Act (P.L. 97-300), title II, part A--Adult and Youth Programs, specifically recommends basic skills and literacy training as essential priorities for undereducated youths and adults. The purpose of P.L. 97-300 stated in Section 2 is

> to establish programs to prepare youth and unskilled adults for entry into the labor force and to afford job training to those economically disadvantaged individuals and other individuals facing serious barriers to employment who are in special need of such training to obtain productive employment.

Section 204, under Use of Funds states that

> services which may be made available to youth and adults with funds provided under this title may include, but need not be limited to . . . remedial education and basic skills training.

Given this context of a profound societal need and a clear Federal mandate for action, a major problem for educational researchers is, therefore, to characterize the features of learning environments that either promote or retard the development of basic skills proficiency. In other words, the identification of salient variables in learning environments that influence basic skills acquisition would be of great use to school personnel concerned with improving the proficiency of their graduates.

Dunkin and Biddle (1974) indicate four major categories of variables involved in research concerned with studying the effects of classroom variables on learning: (1) "presage" variables, such as student and teacher background characteristics, attitudes, beliefs, expectations, and abilities considered to be acquired prior to the learning situation; (2) "context" variables, such as grade level, subject matter, and various social-environmental characteristics of the learning situations; (3) "process" variables, such as overt student and teacher behaviors relevant to the learning situation; and (4) "product" variables, such as the outcomes or results of the learning situation (e.g., standardized test scores, average yearly salary). Their opinion, and that of other researchers in this area (e.g., Brophy 1979; Marshall and Weinstein 1984), is that the least studied of these classes of variables are the "context" variety. As Goodlad (1979) stated,

> Too many researchers are preoccupied with research on single instructional variables that rarely account for more than 5 percent of the variance in student outcomes. Too few study the complex phenomena of schooling in their natural environment, developing the needed new methodologies instead of seeking to adapt the old. (p. 347)

One of the purposes of this report is to identify variables characterizing various types of educational environments that appear to facilitate or retard basic skills acquisition. The present study proposes to describe the social-environmental context of the learning situation and to assess its role in the acquisition of basic skills competency. By employing a variety of testing and interview instruments, as well as a specially adapted observation methodology, this report addresses a question with three components: What sort of student learns which basic skill best in what type of educational setting? A review of relevant empirical findings from the educational literature precedes discussion of the current study's design and results.

Related Research

A large portion of the current research effort revolves around an attempt to characterize the environments in which learning occurs by means of an observation methodology more thoroughly described in chapter 2. Earlier efforts in this direction have been made.

Chavez (1984) reviewed a number of "low-inference" and "high-inference" observation techniques designed to measure classroom social climates. Rosenshine and Furst (1971) defined a high-inference measure as a rating system that requires an observer to make an inference from a series of classroom events using specific constructs such as satisfaction, cohesiveness, and so forth. They defined a low-inference measure as a rating system that classifies specific, denotable, relatively objective classroom behavior and is recorded as frequency counts by an observer.

Chavez (1984) noted that most early researchers of classroom behavior were social psychologists. Most of their research, carried out in the early part of the 20th century, was focused on the nature of interactions among students and between students and teachers.

The work of Dorothy Thomas (1929) was particularly influential in this area. Thomas used "descriptive" (high-inference) accounts of classroom interactions, although she was evidently aware of the problems of subjective bias inherent in this method.

> At their worst, these records are such an intermixture of fact and interpretation as to be utterly worthless from the scientific point of view. Even at their objective best, the selection and emphasis are more or less dependent on the recorder. (p. 3)

Early research in a similar vein, employing observational methodologies, was conducted by Lewin, Lippit, and White (1939) and by Lippit (1940) on the nature of social interactions within and between groups of students. At a later date, Anderson and Brewer (1945, 1946) began developing observational methodologies in an attempt to describe the effect of teachers' classroom behavior on students' behavior and the effect of students' classroom behaviors on each other. These methodologies, however, retained the same problem of potential contamination by subjective bias on the part of the observer.

Chavez (1984) noted that as the 1950s approached, classroom research became more empirically rigorous (low-inference).

> Hypotheses were derived from analysis of time lapse pictures, recordings . . . and observations in the classroom by sensitive and trained educators using newly developed measures, which were often compared with the results of standardized tests (cf. Medley and Mitzell, 1963; Withall and Lewis, 1963). (Chavez 1984, p. 240)

Amidon and Hough (1967) have discussed another highly influential observational system developed during the 1960s called the Flanders Interaction Analysis System (FIAS). This system was regarded as innovative at the time because of its capability of preserving a large amount of information specific to the sequence of behaviors being observed. The FIAS tended to focus on teacher influences in the classroom, and rated 10 factors on their direct and nondirect influence. This system was used extensively throughout the 1960s and 1970s. Although less inferential in nature, the emphasis on teacher characteristics tended to detract from the importance of the student's relation to the learning environment.

Nevertheless, a great deal of research has been concerned with the effect of various teacher characteristics on the acquisition of basic skills. Anderson (1982), for instance, discussed the acquisition of basic skills as a function of teachers' "classroom management" skills. As conceived by Anderson, classroom management involves such teacher responsibilities as

> organizing and physical environment and student movement through the room, scheduling and pacing various activities, organizing instructional supplies and materials and arranging for their use in ways that facilitate learning, keeping up with student programs for the purpose of guiding instruction, monitoring students' attention and behavior to ensure that they benefit from instructional activities, and attending to the many routine details of school life. (p. 33)

Brophy and Putnam (1979) found that teacher classroom management skills were a major predictor of student achievement in the basic skills of reading, mathematics, and language. The strong positive effect of classroom management may result from the increased time in which students are engaged in instruction or learning activities. However, the question of how one can measure a variable such as classroom management in a reliable way is not addressed by Brophy and Putnam. Although teacher behavior in the classroom is undoubtedly important in students' acquisition of basic skills, our own model proposes to make the student, rather than the teacher, the unit of analysis.

Brophy (1979) pointed out that many educators and educational researchers are overly concerned with issues of curriculum at the expense of issues of teaching method and, we would argue, with educational environmental concerns. He stated that "it seems intuitively obvious that educational outcomes will be determined by both what is taught (curriculum) and how it is taught (method) and that both aspects need investigation" (p. 734). Although applied to the early grades by Brophy, his conclusions may also apply to secondary-level learning environments. He concluded that learning gains tended to be most impressive in classrooms in which students engaged in a great deal of interaction with the teacher. Lessons that were briskly paced, but conducted at a difficulty level that allowed consistent success, tended to promote greater learning. Flanders (1970) obtained data that indicated that a good environment for learning is exemplified when extensive teacher elicitation of student ideas and the integration of these ideas into the content of class discussion occurs, reinforced by generous praise for valuable student contributions.

Other areas of research have concentrated less on the teacher as the primary focus of interest and more on the student. A great deal of this research focuses on the student's perception of the school or classroom environment and the effect of that perception on various measures of school performance.

Magnusson (1981a) differentiated between describing the environment "as it is" and the environment "as it is perceived." This distinction is also maintained in the current study, which seeks to characterize the environment as it is by means of "task episode" analysis (Moore 1981), and the environment as it is perceived by means of instruments such as the Classroom Environment Scale (CES) (Moos and Trickett 1974) and the Work Environment Scale (WES) (Moos 1981).

The usefulness of assessing the perceived nature of the learning environment lies in its value as a predictor of a student's chances of success in the attainment of basic skills proficiency. As Magnusson states,

> Having an understanding of an individual's conceptions of the world and an understanding of his perceptions and interpretation of the specific situation in which he finds himself makes it possible to understand his actual behavior in that situation. (p. 5)

Magnusson (1981b) puts forth two fundamental reasons for making "situations" (i.e., the social-environmental context in which behavior occurs) a subject for observation and analysis: (a) situations are important from a developmental perspective, in that individual perceptions of situations mediate between the actual environment and an individual's developing conceptions and attitudes in relation to it; and (b) behavior does not occur in a social vacuum, but takes place within and is directly influenced by the context of a particular physical-social environment. For these reasons, realistic and functional models of psychological processes (e.g., the acquisition of basic skills proficiency) must attempt to account for the influence of situational factors.

Magnusson stated that events and sequences of events may be the important units of analysis in investigating any person-by-situation interaction. The task episode, the fundamental unit of analysis employed in attempting to assess the physical-social environment as it is in the present study, represents an attempt to capture quantitatively the complexity of situational effects being called for by Magnusson, Goodlad, Brophy, Marshall, and Weinstein, and others.

Marshall and Weinstein (1982, 1984) have also been concerned with the development of an observation system that can adequately capture the complexity of the classroom environment. However, they stress the difficulties involved in developing a system sufficiently sensitive to subtle, yet potentially meaningful, variations in the classroom environment. Though perhaps easily perceived by students and potentially influential on school performance, these phenomena may be undetected by an insufficiently sensitive observation system. For this reason, it seems essential not only to develop increasingly sensitive observational systems, which is one of the goals of the present research, but also to supplement these systems with other research instruments such as the CES and WES in order to assess the student's own perception of the environment. Thus, a variety of instruments must be used to converge on an adequate description of the social-physical nature of the classroom since no single instrument is likely to be sufficient.

An evaluation of a model of learning that proposes multiple influences, of which the authors' model is an example, must measure many aspects of the learning situation in order to adequately characterize the processes involved. Our major criticism of the majority of the aforementioned studies is that their scope of research has been too narrow to capture the complexity of the learning environment.

Several of Marshall and Weinstein's concerns in characterizing the nature of the "task structure" within the classroom have corollaries with the "task episode analysis" technique used in the present study. Marshall and Weinstein are concerned, for instance, with the following factors: (1) the variety of tasks occurring simultaneously, (2) divergencies in processes and products of the task, (3) differences in the sequence and pace of tasks for different individuals, (4) the level of task difficulty, and (5) the amount of content covered. By "divergence in processes and products," Marshall and Weinstein refer to situations in which the task is such that students can carry it out in highly individualized ways, and in which no particular right answer or set of right answers are necessarily involved. This situation is referred to as "divergent production." As the authors indicate,

> Previous research has overlooked the possibility that where tasks require divergent rather than convergent processes or result in dissimilar products, comparative evaluation between students' work may be more difficult to make. (1984, p. 308)

This process dichotomy may indicate a difficulty in comparing the standardized test performance of college preparatory and vocational education students. The former curriculum may emphasize more divergent types of cognitive strategies whereas the latter may emphasize more convergent strategies.

Weinstein (1976) emphasized the role of feedback as an additional environmental factor in establishing an effective or ineffective classroom environment. For example, when a great deal of positive feedback for less than perfect performance is given, differences in expectations for adequacy of performance may emerge. In general, the criterion used by a particular instructor for positive and negative feedback, in combination with perceived consistency of differential application of positive and negative feedback by the instructor to particular individuals within the class, may greatly affect the perceived environment of the students.

Objectives

In general, the major conclusion that can be drawn from the classroom research carried out to date is that investigators have tended to focus on only one or two classes of variables at a time. The result has been failure to capture the overall complexity of the learning situation. The present study, by contrast, addresses the complexity of environmental and personal influences on basic skills acquisition by combining a variety of low- and high-inference methods. The study uses a number of instruments in order to converge on an answer to the long-term goal of this line of inquiry, which is: What sort of student learns which basic skill best in what type of setting?

The research effort was designed to examine student participation in four educational programs and their corresponding environments or settings to determine which situational and demographic variables have an impact on basic skills acquisition. Specifically, for this year, the study sought to achieve the following objectives:

- To describe the relationships between students' basic skills performance at three intervals (pretest, at the beginning of the school year; at the midpoint of the school year; and posttest, at the end of the school year) and their participation in one of four educational/curricular programs (college preparatory, general education, vocational nonco-op, and vocational co-op)*
- To isolate and describe the major factors that characterize the program environments and that have potential for influencing basic skill acquisition.

The four school programs selected for participation emphasized different arrangements for learning. The first two programs were alternative models of vocational education. The first, vocational noncooperative, offered students the opportunity to earn academic credit through the practical application of career principles in an in-school, lab setting. The second, vocational cooperative, enabled students to receive academic credit for on-the-job training in addition to receiving classroom education to prepare for full-time employment. The general education program was designed to aid students in the development of realistic career and life goals and to help them gain a broad understanding of the world of work and the various components within it. Finally, the college preparatory program included was designed to provide students with the requisite skills and knowledge necessary for success in the college-level academic environment.

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*Students were also tested after the summer break in order to assess their retention of basic skills. These data, however, are not analyzed for this report. The data will be analyzed and reported in the Year IV National Center grant in order to provide a more definitive answer to the question of which student learns which basic skill best in what type of setting.

Limitations

Conclusions and recommendations from this study should be evaluated in light of various constraints that were imposed on the conduct of the research. First of all, the sample of students was drawn from a single, urban, midwestern school district. For this reason the results may, to some extent, be overly specific to the particular school district sampled. Although this school district may be considered to be largely comparable to those in other urban areas, the application of conclusions from this study should be carried out with the differences between the reader's own district and the district under study firmly in mind.

Second, constraints were imposed on the design of the study as a result of the contractual agreement with the school district under study and also because of the structure of this district's curriculum. School officials required that intact classrooms be sampled, rather than individual students, using course descriptions to determine if the class represented college preparatory, general education, vocational nonco-op, or vocational co-op subject matter. Furthermore, the structure of this particular school district was such that vocational nonco-op classes were offered only in career education centers that students themselves chose to attend. The comprehensive high schools sampled, which students were assigned to by the school district, offered courses in the other three school programs. Therefore, an unavoidable problem was created in the research design between school building, classroom, and school program, since an orthogonal crossing of these variables was not possible. The self-selection of students into programs is an important factor to consider when interpreting the results of the study. A common method of addressing the nature of the self-selection factor is to analyze student demographic characteristics to determine if there are consistent student background variables that explain the self-selection. Because the Office of Management and Budget (OMB) placed restrictions on the types of student data that could be collected, the more traditional demographic variables such as parent education and occupation were excluded from the data collection effort. Thus, the study has limited student background information to examine the factors related to student self-selection into educational programs.

Scope of This Report

This report's intended audience is vocational researchers, policy workers, and counselors. The report will describe student math and reading performance at three intervals: pretest, midtest (middle of school year) and posttest (end of school year). The report also will compare student performance across the four instructional programs of college preparatory, general education, vocational education nonco-op, and vocational education co-op. In addition, the major factors that characterize the program environments will be described.

The report is organized into three chapters and four appendices. Chapter 1 provides the introduction and the scope of the report. Chapter 2 describes the research methodology and design and the research objectives. Chapter 3 presents the findings and conclusions of the research. Each appendix is a self-contained section that describes specific results related to the research effort. Appendix A describes the students in the sample. Appendix B presents the results of the students' perceptions of their programs using the Classroom and Work Environment Scales. Appendix C describes the students' learning environments based on the task episode analysis from the classroom and work observations. Appendix D describes the students' performance in math and reading skills and relates the performance to student characteristics. Appendices A, B, and C describe the variables in specific data sets. Appendix D, however, presents an initial examination of the model to answer the question of which students learn which basic skills in what settings.

CHAPTER 2

RESEARCH DESIGN AND METHODOLOGY

Research Design

This chapter describes the design of the research and the instruments that were used to observe students' behavior, to describe learning environments, and to measure basic skills achievement. A description of the sample of students, their school programs, and the data collection procedures will also be provided.

This research is being conducted with the assumption that the acquisition of basic skills proficiency is a function of at least three groups of factors. School environmental factors (e.g., feedback, teacher support); personality factors (e.g., demographic characteristics, study habits); and school program factors (e.g., student enrollment in a college preparatory, general education, or vocational education program) are all hypothesized as influencing the acquisition of basic skills for high school students. To determine students' basic skills proficiency at different stages of the school year, a repeated measures design was used. This design is depicted in figure 1.

During the course of the 1984-85 school year, data on numerous potential independent variables were collected. For this initial report the decision was made to look at the relationships of a reduced number of those variables to basic skills achievement. That limited set of independent variables was grouped in terms of the following three clusters:

Educational/ Curricular Programs*	COLLEGE PREPARATORY	GENERAL EDUCATION	VOCATIONAL NONCO-OP	VOCATIONAL CO-OP	
	X_1	X_2	X_3	X_4	
Environments/ Settings	Classroom	Classroom	Classroom Laboratory	Class/ Lab	Work Site

Repeated Measures Design

$O_1 \quad X_1 \quad O_2 \quad X_1 \quad O_3 \quad O_4$

$O_1 \quad X_2 \quad O_2 \quad X_2 \quad O_3 \quad O_4$

$O_1 \quad X_3 \quad O_2 \quad X_3 \quad O_3 \quad O_4$

$O_1 \quad X_4 \quad O_2 \quad X_4 \quad O_3 \quad O_4$

Observations	Time	Measures
O_1 (preprogram)	9/84	o CTBS; Math, Reading o NAEP; Math, Reading
O_2 (midpoint of program)	1/85	o Same as O_1 measures
O_3 (postprogram)	6/85	o Same as O_1 measures plus o Student interviews o Classroom Environment Scale o Work Environment Scale
O_4 (follow-up program)	9/85	o Same as O_1 measures
O_1 to O_2 (program environment)	10/84-11/84	o Observations of selected students in program settings
O_2 to O_3 (program environment)	2/85-3/85	o Observations of selected students in program settings

*Curricular programs can be generally defined as follows: College preparatory--those preparing students for college; vocational--those preparing students for employment immediately following high school graduation; general--those with students considering themselves to be in neither academic nor vocational programs (National Center for Education Statistics 1983, p. 36).

Figure 1. Research design

- Design-related: The variables in this cluster were integral to the implementation of the overall sampling approach used in the project. These variables are school building, school program, grade level, and classrooms within programs within schools.
- Demographics: The three variables of sex, race, and lunch assistance (free/reduced-cost lunch) served to describe the selected demographic characteristics of the sampled students.
- Other characteristics: This cluster included variables that dealt with the students' experiences in school, their school-related activities, and their educational plans. These variables include grades, hours watching TV, hours spent on homework, part-time work, number of extra-curricular activities, and number of college preparatory and vocational courses taken.

As indicated in figure 1, the assessment of the students' basic skills achievement (dependent variables) was undertaken at three points during the school year via the use of selected mathematics and reading items from the National Assessment of Educational Progress (NAEP) test item pool and the Reading Comprehension and Mathematics Concepts and Application Subtests from the Comprehensive Tests of Basic Skills (CTBS). For purposes of this report, the decision was made to compute a total mathematics score and a total reading score (per test administration) based upon the combined sets of mathematics and reading items.

Research Instrumentation

To achieve the project objectives, a variety of research instruments/processes were employed. The relationships (shown by an X) between the specific instruments and the research variables are illustrated in figure 2. A brief description of each instrument follows.

Research Instrumentation	Research Variables						
	Basic Skill Attainment	Program Environment Characteristics and Factors		Student Perceptions of Program Environments			Student Characteristics
		Classroom Setting	Co-op Work Site	Classroom Setting	Co-op Work Site	Part-time Work Site	
Classroom/Workplace Observations	X	X	X				
Classroom Environment Scale Work Environment Scale				X	X	X	
Comprehensive Tests of Basic Skills and Selected Items from National Assessment of Educational Progress o mathematics o reading	X						
Student Interviews				X	X		X

Figure 2. Relationship between research instrumentation and research variables

Classroom/Workplace Observation--Task Episode Analysis

A large part of the effort that went into this research centered around the development of an observational method that would allow description of learning environments in terms of an array of variables (see table 1), each of which being quantifiable at least at the ordinal level of measurement. The study's partial focus on environmental characteristics affecting basic skills acquisition required that students be observed and their behavior be described as it occurred in actual learning environments. To capture information from these settings, it became necessary to use a naturalistic observation technique to collect environmental information and to develop a heuristic framework for describing the phenomena observed.

Moore (1981) introduced the method of "task episode analysis" in the context of anthropological research; his general technique was used as the model for the observation methodology used in the current study. This method of observation focuses on the processes by which students encounter and accomplish tasks, the general features of the environment, and their impact on learning. According to this method, the unit of analysis is the "task episode," defined as a segment of time in which an individual's attention remains focused on the completion of a particular task. The task episode is event dependent rather than time dependent. It may consist, for example, of a series of events in which a

TABLE 1

DEFINITIONS OF OBSERVATIONAL VARIABLES

Environmental Factors

Articulation	How a task episode relates to other tasks performed at the organization. If other students/workers rely on the student to complete a task before commencing their own, it is an articulated task episode.
Autonomy	The degree of flexibility that the student has in carrying out the task.
Coordination	Extent to which task episodes require the student to carry out a wide variety of tasks, cope with interruptions, and carry out more than one task simultaneously.
Feedback	Extent to which the student receives direct and clear information about the effectiveness of his or her performance.
Importance	The degree to which carrying out the required tasks will have an impact on the life of the student, other people, and the organization.
Initiator	Who initiated the task episode.
Instruction	The proportions of student prescription and discretion in task episode performance.
Major task episodes	The number of major categories used to determine/identify task episodes.
Simultaneity	Two or more task episodes (or parts of task episodes) being done at the same time.
Split task	The task episode in which the student is interrupted before the task is completed but which the student returns to complete later.
Support	The availability of other people for assistance or instruction.

Basic Skills Development Scales

Language skills	The overall level of task episode requirements for the student to read, write, and speak, ranging from reading or repeating simple phrases to reading or composing complex sentences.
Mathematical skills	The level of task episode requirements for the student to deal with mathematical problems and operations, ranging from copying numbers to performing higher order mathematical procedures.

TABLE 1--Continued

Reading skills	The level of task episode requirements for the student to read materials, ranging from reading simple instructions to complex sources of information.
Reasoning skills	The level of task episode requirements for the student to deal with theory vs. practice or abstract vs. concrete situations.
Speaking skills	The level of task episode requirements for the student to speak, ranging from speaking simple sentences to sophisticated presentations.
Writing skills	The level of task episode requirements for the student to write, ranging from writing simple sentences to detailed or elaborate papers.
Attentional Measures	
Data function	The level of information, ideas, and facts used by the student.
People function	The level of the student's interaction with students, co-workers, teachers, or supervisors.
Things function	The level of the student's physical interaction with objects (e.g., typewriters, cash registers, drafting tools).
Data orientation	The percentage of the student's involvement with data in contrast to people and things.
People orientation	The percentage of the student's involvement with people in contrast to data and things.
Things orientation	The percentage of the student's involvement with things in contrast to data and people.

SOURCE: Adapted from U.S. Department of Labor, Manpower Administration (1972).

student encounters a problem, works on it, and receives information about the quality of performance. The length of the task episode is a function of the type of activity being performed; it is not, therefore, dependent on any arbitrary unit of time.

According to Moore, task episodes consist of two features, logical-technical and pragmatic. Logical-technical features include the skills, information, operations, and resources used to perform the task. For example, what physical or psychomotor skills are employed? How complex is the task--that is, how many separable components, operations, logical relations, and modalities does it involve? How much space and time were used in carrying out the task? What relational or communication skills were used? Pragmatic features, on the other hand, are identified by the relationship between the task episode and its social context. For example, how central and essential is the task to the operation of the organization? What social prestige or status is attached to the performance of the task? Does this task qualify a person technically or otherwise for other higher, more complex work?

Using Moore's framework as a starting point, project staff developed a framework for identifying and describing the acquisition of basic skills in four environments. Moore's logical-technical dimension was primarily represented in the current study by the presence or absence of six basic skills. The six basic skill areas, defined in table 1, are as follows:

- Language
- Mathematical
- Reading
- Reasoning
- Speaking
- Writing

The rest of the variables defined in table 1 corresponded to other aspects of Moore's framework. Eleven environmental variables were assessed:

- Articulation
- Autonomy
- Coordination
- Feedback
- Importance
- Initiator
- Instruction
- Number of major task episodes within a given observation interval
- Simultaneity
- Number of split tasks
- Support

The environmental factors are a mixture of Moore's logical-technical and pragmatic variables. Those variables that characterize the complexity of the task (e.g., simultaneity) are logical-technical in nature, whereas those that characterize the nature of the task in regard to the situation in which it occurs (e.g., importance) are pragmatic.

At the same time, six attentional measures (table 1) were assessed for each task episode. These variables are logical-technical, in that they seek to characterize students' attentional orientation to three classes of factors present in the environment: people, things, and data.

Observations of student behaviors were conducted in the form of comprehensive field notes, easing the observer's burden of having to record and classify events simultaneously. Observers were encouraged to review their notes following each observation period in order to add more specific information where it was needed. At this point, the observer divided the field notes into task episodes by identifying intervals during the observation period in which a student's attention was directed toward the completion of a particular task. Since observations were conducted in the classroom and in the student's part-time co-op workplace, typical task episodes included taking a test, working on a math exercise, reading a short story, bagging a customer's groceries, or preparing a food order in a restaurant. Behaviors and activities within each task episode were then coded using the definitions of the observational variables and a coding strategy modeled after that devised by Halasz and Behm (1983). The format of their coding form was modified to incorporate both the ideas of task episode analysis as well as the specific behaviors related to environments and basic skills performance.

Observers for the current study received extensive training from practice in coding videotaped classroom and work place situations followed by group instruction and discussion on procedures for recording and classifying the events in an observational period. Emphasis was placed on establishing a consistent criterion for identifying individual task episodes and on maintaining consistent scoring for observed levels of the observational variables.

In the field, observers' responsibilities were first to record student behaviors and later to classify them into defined categories. After each observation period, which lasted approximately 50 minutes, observers reviewed the field notes of their observations and classified them by the variables used in the study. For some variables (e.g., presence or absence of a supervisor or co-worker), classification presented no uncertainties. For other variables (e.g., data, people, and things orientation), classification of field notes required precise instruction during training on the observable features of the variable.

To achieve the objectives of the data collection procedures, each observation required the completion of the following:

- Background Information Form--observation times and places, student and supervisor characteristics, environmental characteristics, and interpretive comments
- Field notes--written descriptions of students' task behaviors
- Task Episode Coding Form--conversion of the written field notes into quantified levels of the basic skill, as well as environmental and attentional variables

The coded information derived from the written field notes constituted the data that were analyzed to characterize differences in the presence and level of usage of the observational factors in various learning environments. These environments included college preparatory, general education, vocational nonco-op, and vocational co-op classrooms, as well as vocational co-op workplace settings.

The reliability of the observations was assessed in two ways. First, during observer training, the trainees took field notes and coded them according to a previously set criterion, so that their coding forms matched the exemplary forms. Second, during the actual on-site observation period, one of the researchers in the study went out with each observer to take field notes and code them independently of the observer. The criterion used for reliability between raters was a 95 percent match between coding values on the coding form. This criterion was achieved in all cases.

The distribution of the 360 observations is displayed in table 2. This table shows the number of observations by program and by high school membership.

The observational methodology evolved into a critical means of assessing the effect of environmental characteristics on basic skills acquisition. However, other more familiar and widely used research instruments were also used to obtain information about the students' environments.

TABLE 2

DISTRIBUTION OF OBSERVATIONS BY EDUCATIONAL PROGRAM AND HIGH SCHOOL MEMBERSHIP

EDUCATIONAL PROGRAMS	COMPREHENSIVE HIGH SCHOOLS AND CAREER EDUCATION CENTERS (Number of Observations)						Number of Obser. for Junior	Number of Obser. for Senior	TOTAL NUMBER OBSER. PER PROGRAM
	Comprehensive High Schools				Career Centers				
Classrooms/Subject Matter	School #1	School #2	School #3	School #4	School #5	School #6			
COLLEGE PREPARATORY									
Math		20					60	20	80
English			20	20					
Social studies	20								
GENERAL EDUCATION									
Math				20			60	20	80
English	20		20						
Social studies		20							
VOCATIONAL EDUCATION-NONCOOPERATIVE									
Banking & admin. specialist					40		60	20	80
Department store marketing						20			
Auto technician specialties					20				
VOCATIONAL EDUCATION-COOPERATIVE									
Cooperative office educ.									
Classroom	8	8	8	8			0	120	120
Work site	8	8	8	8					
Distributive educ.									
Classroom	8	8	8	4					
Work site	8	8	8	4					
TOTAL NUMBER: OBSERVATIONS PER SCHOOL	72	72	72	64	60	20	180	180	360

Classroom Environment Scale

The Classroom Environment Scale (CES) (Moos and Trickett 1974) was designed to assess the social climates of junior high and high school classrooms. It focuses on the measurement and description of teacher-student and student-student relationships and on the type of organizational structure of a classroom. As Moos and Trickett, the developers of the CES, state, "The basic assumption is that the consensus of individuals when characterizing their environment constitutes a measure of environmental climate and that this climate exerts a directional influence on behavior" (p. 1). The CES was therefore administered in order to differentiate between school programs by characterizing the perceptions of individuals in relation to their school environment.

Form R of the CES, consisting of 90 statements concerning junior and senior high school classrooms (e.g., "There are very few rules to follow"), was used. Students were asked to indicate which statements were true and which were false in relation to the classroom they were asked to rate. The statements were classified into nine subscales by the developers of the CES. Table 3 provides a list of the CES subscales with a brief description of each. The results of the CES administration (see appendix B) will relate to these nine subscales.

TABLE 3
CLASSROOM ENVIRONMENT SCALE SUBSCALE DESCRIPTIONS

1. Involvement - measures the extent to which students have attentive interest in class activities and participate in discussions. The extent to which students do additional work on their own and enjoy the class is considered.

2. Affiliation - assesses the level of friendship students feel for each other, i.e., the extent to which they help each other with homework, get to know each other easily, and enjoy working together.

3. Teacher Support - measures the amount of help, concern, and friendship the teacher directs toward the students. The extent to which the teacher talks openly with students, trusts them, and is interested in their ideas is considered.

4. Task Orientation - measures the extent to which it is important to complete the activities that have been planned. The emphasis the teacher places on staying on the subject matter is assessed.

5. Competition - assesses the emphasis placed on students' competing with each other for grades and recognition. An assessment of the difficulty of achieving good grades is included.

6. Order and Organization - assesses the emphasis on students' behaving in an orderly and polite manner and on the overall organization of assignments and classroom activities. The degree to which students tend to remain calm and quiet is considered.

7. Rule Clarity - assesses the emphasis on establishing and following a clear set of rules and on students' knowing what the consequences will be if they do not follow them. An important focus of this subscale is the extent to which the teacher is consistent in dealing with students who break rules.

8. Teacher Control - measures how strict the teacher is in enforcing the rules, and the severity of the punishment for rule infractions. The number of rules and the ease of students' getting into trouble is considered.

9. Innovation - measures how much students contribute to planning classroom activities, and the amount of unusual and varying activities and assignments planned by the teacher. The extent to which the teacher attempts to use new techniques and encourages creative thinking in the students is considered.

SOURCE: Moos and Trickett (1974).

Work Environment Scale

The Work Environment Scale (WES) (Moos 1981) consists of 90 statements, classified into 10 subscales, that are designed to measure perceptions of work environments. Form R, used in the current study, measures perceptions of existing work environments. Table 4 provides a list of the WES 10 subscales with a brief description of each. Results of the WES administration (see appendix B) will be discussed in terms of these 10 subscales.

The WES was administered to two groups of students: those who held school-related part-time jobs (vocational co-op students) and those who held non-school-related jobs. This report will discuss comparisons of results among the school programs in order to contrast general perceptions of the work environment as opposed to the school environment.

Comprehensive Test of Basic Skills

The CTBS, Form V, Level J (grades 10.6-12.9) was used as one means of assessing basic skills achievement at three points during the school year. The CTBS tests are a series of norm-referenced achievement tests, two of which--reading and mathematics--were used in this study.

Reading tests. At the lowest test levels, items in various formats measure visual and sound recognition of letters, words, vowels, and consonants. Orally presented vocabulary items measure ability to recognize categories and definitions. Items measuring comprehension skills are related to sentences and stories read by the examiner.

TABLE 4

WORK ENVIRONMENT SCALE SUBSCALE DESCRIPTIONS

1. Involvement - the extent to which employees are concerned about and committed to their jobs.

2. Peer Cohesion - the extent to which employees are friendly and supportive of one another.

3. Supervisor Support - the extent to which management is supportive of employees and encourages employees to be supportive of one another.

4. Autonomy - the extent to which employees are encouraged to be self-sufficient and to make their own decisions.

5. Task Orientation - the degree of emphasis on good planning, efficiency, and getting the job done.

6. Work Pressure - the degree to which the press of work and time urgency dominate the job milieu.

7. Clarity - the extent to which employees know what to expect in their daily routine and how explicitly rules and policies are communicated.

8. Control - the extent to which management uses rules and pressures to keep employees under control.

9. Innovation - the degree of emphasis on variety, change, and approaches.

10. Physical Comfort - the extent to which the physical surroundings contribute to a pleasant work environment.

SOURCE: Moos (1981).

Various word attack skills, including understanding of structural word parts and word forms, are measured at the primary and intermediate test levels. Reading vocabulary items through the upper test levels measure categorization, same-meaning words, words in context, multimeaning words, and word affixes. Reading comprehension items measure skills in understanding sentence meaning, passage details, character analysis, main ideas, generalizations, written forms, and author techniques.

Mathematics tests. Mathematics computation items measure the operations of addition, subtraction, multiplication, and division. Applications of mathematical concepts and conventions are measured in such content areas as numeration, number sentences, number theory, problem solving, measurement, and geometry.

National Assessment of Educational Progress

Selected mathematical and reading items from the NAEP test were administered in conjunction with the CTBS as a converging measure of basic skills achievement at the three test intervals. Task staff obtained the necessary instructional scripts from NAEP personnel and produced an audiotape for test administration according to NAEP specifications.

The 24 NAEP math items used were classified as involving the application of routine problem-solving strategies. These items had National norms in the lower 50th percentile so that students would have an opportunity to show improvement with time and required students to generate an answer rather than select a multiple-choice response as in the CTBS. The NAEP items were chosen to augment the CTBS math items. Three reading passages (with a total of 15 test items), classified as expository/evaluative and using a multiple-choice format, were selected to supplement the CTBS reading test.

Student Interview Form

Task staff developed an interview form (see appendix A) in order to obtain information from students that could be used in conjunction with the achievement test data to isolate salient personality variables that may be related to basic skills achievement. The form was pilot tested with nine students for readability and then was submitted to OMB for approval. Items on the interview form included questions concerning the type and number of courses taken in high school, number of hours spent each evening watching television or working on homework, plans for the future, and others. Several statements designed to elicit perceptions of the school and workplace environment were also included.

Selection of Students

Through a subcontract arrangement, a midwestern urban public school system participated in this research effort. Their participation included selecting a sample of students, securing student and parent cooperation, testing students, and making arrangements for research staff to conduct observations and interviews in classrooms and cooperative work sites.

In the first step of sample selection, the school personnel chose four comprehensive high schools (25 percent of the district's total) that were representative of the geographical distribution of high schools in the city and of the number of students in the city's high schools. In addition, two career education centers (50 percent of the district's total) were selected because they offered vocational education noncooperative courses. In this particular system, vocational education cooperative courses are offered only for the clerical and distributive education areas. To obtain a sample of approximately 400 students, the school system required that intact classrooms be selected rather than individual students, using course descriptions to determine if the class represented college preparatory, general education, vocational nonco-op, or vocational co-op subject matter. All student testing and observation were conducted in these classrooms. Table 5 displays the distribution of classrooms and students for each high school and program area. In this table, schools one through four represent the comprehensive high schools, whereas schools five and six represent the career education centers. The key features of the 4 programs are displayed in table 6.

Various demographic characteristics of the students in the sample are shown in table 7. This table summarizes the distribution of students' gender, race, and grade level within the four educational programs. The preponderance of females in the sample results from the fact that most students in the clerical vocational programs are female, which is typical of students in

TABLE 5

DISTRIBUTION OF CLASSROOMS AND STUDENTS BY EDUCATIONAL PROGRAM AND HIGH SCHOOL MEMBERSHIP

EDUCATIONAL PROGRAMS	COMPREHENSIVE HIGH SCHOOLS AND CAREER EDUCATION CENTERS (# of classrooms, # of students)						Total Per Program: Number of Classrooms	Total Per Program: Number of Students
Subject-Matter Content	School #1	School #2	School #3	School #4	School #5	School #6		
COLLEGE PREPARATORY								
Math		1, 13					4	90
English			1, 26	1, 22				
Social studies	1, 29							
GENERAL EDUCATION								
Math				2, 22			5	79
English	1, 17		1, 31					
Social studies		1, 9						
VOCATIONAL EDUCATION-NONCOOPERATIVE								
Banking & admin. specialist					2, 65		5	117
Department store marketing						2, 28		
Auto technician specialties					1, 24			
VOCATIONAL EDUCATION-COOPERATIVE							8	139
Cooperative office educ.	1, 20	1, 16	1, 15	1, 14				
Distributive educ.	1, 15	1, 12	1, 28	1, 19				
TOTAL PER SCHOOL: # of classrooms/ # of students	4, 81	4, 50	4,100	5,77	3, 89	2, 28	22	425

TABLE 6

PROGRAM COMPARISON OF KEY FEATURES

KEY FEATURES	PROGRAMS			
	College Preparatory	General Education	Vocational-Cooperative	Vocational Noncooperative
Location	Midwest, urban center, high school program within a comprehensive high school	Midwest, urban center, high school program within a comprehensive high school	Midwest, urban center, high school program within a comprehensive high school	Midwest, urban center, high school vocational program within a vocational center
Description/ Purpose	Prepares students for college-level study through the use of a structured academic program. To provide students with the requisite skills and knowledge necessary for success in the college-level academic environment.	To aid students in the development of realistic career and life goals, and to help them gain a broad understanding of the world of work and the various components within it.	Enables students to receive on-the-job training and some classroom education and to prepare for full-time employment.	Permits students to earn academic credit through the practical applications of career principles in a lab setting.
Percentage of time for -Classroom setting -Workplace setting	Classroom: 100% Workplace: 0%	Classroom: 100% Workplace: 0%	Academic Classroom: 23% Vocationally Related Classroom: 23% Vocationally Related Workplace: 54%	Academic Classroom: 50% Vocational Lab and Related Instruction: 50%
Payment	None	None	Minimum or near minimum wage	None
Length of program	4 years	4 years	1 year	2 years

TABLE 6—Continued

KEY FEATURES	PROGRAMS			
	College Preparatory	General Education	Vocational-Cooperative	Vocational Noncooperative
Type of work placement	None	None	On-the-job training (Specific position)	None
Total credits required for graduation	19	17	17	17
Total credits given for program participation	19	17	3.5	6
Type of credits for program participation	Academic, elective	Academic, elective	Vocational	Vocational
Advisory committee	No	No	Yes	Yes

TABLE 7

CHARACTERISTICS OF STUDENTS IN THE SAMPLE

PROGRAMS	N	STUDENT CHARACTERISTICS					
		Sex (N)		Race (N)		Grade Level (N)	
		Male	Female	White	Black	11th	12th
Academic/College Preparatory	90	37	53	53	37	54	36
General Education	79	42	37	42	37	49	30
Vocational Education Noncooperative	117	36	81	43	74	79	38
Vocational Education Cooperative	139	31	108	77	62	3	136
Total number of students	425	146	279	215	210	185	240
Percentage of total		34%	66%	51%	49%	44%	56%

this occupational area. The even distribution of white and black youth in this sample reflects the distribution of the races within the particular school system observed. The inclusion of both juniors and seniors is a result of several constraints. First of all, in this school system, the vocational co-op courses are designed only for seniors. Therefore, seniors had to be included in all four school programs to enable comparisons of basic skill performance as a function of program participation (e.g., controlling for age and grade level). Second, an initial goal of this research effort was to investigate students' basic skill performance after the summer vacation and to examine the retention of basic skills in relation to participation in one of the four school programs. Thus, juniors were included in the sample in an attempt to ensure the availability of students for testing after summer vacation. Results from this testing will be reported in a second report prepared during Year IV of the National Center grant.

Data Collection Procedures

Data collection was carried out during the 1984-85 school year. During the first month of school, the CTBS and NAEP tests were administered to obtain a baseline measure of basic skills proficiency at the beginning of the school year. At the same time, demographic information of the type contained in table 7 was obtained for each student. During the fall of 1984, an initial round of 180 classroom observations was carried out.

At the midpoint of the school year, the CTBS and NAEP tests were once again administered to students to obtain a measure of change in basic skills proficiency since the beginning of the school year. At the same time, the students completed CES and WES. The CES was given to all students, who were then asked to rate a particular classroom. The teacher of that class was also asked to complete the CES. All students who held part-time jobs, either school-sponsored or otherwise completed the WES; their work supervisors were also asked to complete the WES.

During spring 1985, a second round of 180 classroom observations was carried out. Students also completed the student interview form during this interval of the school year. Finally, during the last month of the school year, students took the CTBS and NAEP tests once more. This round of testing was carried out in order to compare students' basic skills proficiency at this stage of the school year with that of previous stages.

CHAPTER 3

FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

This chapter provides the reader with a comprehensive overview of the results from this year's study. The results are organized in four sections. The first describes the characteristics of the students in the sample and the second summarizes the major findings for the skill demands in the learning environments. The third section presents the findings of the students' perceptions of their learning environments. The final section provides an initial examination of the relationship between students' basic skill achievement and educational programs in order to answer the question of which student learns which basic skill in what setting.

Student Characteristics

The characteristics of the students in the sample were obtained from interviews with the students. For purposes of describing student characteristics, membership in a school program--college preparatory (N = 84), general education (N = 58), or vocational, both nonco-op and co-op (N = 239)--was defined by the students' own self-report. A more complete presentation of the data can be found in appendix A. This section provides an overview of selected descriptive characteristics of the students in each of the programs.

School Course Work

Students were asked to indicate the grade levels in which they had taken any of a variety of courses, including mathematics, English or literature, history or social studies, foreign languages, science, business or office courses, sales or marketing, trade and industry, technical courses, and other vocational or elective courses. A majority of students in all three school programs indicated having taken a mathematics course in both of the first 2 years. However, although this trend continued for college preparatory students throughout all 4 years of school, the majority of vocational and general education students (76.1 percent and 57.9 percent, respectively) indicated that they took no math in their senior year. Among juniors, 52.4 percent of vocational students indicated that they did not take any math courses during their junior year, whereas a majority of students in the other two programs did.

For the most part, enrollment in English and social studies classes remained high for all school programs across all four years of school. College preparatory students were, however, more likely than were vocational or general education students to enroll in these courses.

Approximately 21.5 percent of all students reported never having enrolled in a foreign language course. This figure for vocational students was even higher, 26.4 percent of whom had never taken a foreign language. By comparison, 22.4 percent of general education and 7.1 percent of college preparatory students had never taken a foreign language.

Enrollment in science classes showed a steady decrease from grade 9 to grade 12, although the drop-off in enrollment occurred somewhat earlier for general education and vocational students than for college preparatory students. Among the seniors in our sample, 80.0 percent of college preparatory students had enrolled in a science class in their junior year, whereas only 34.2 percent of vocational and 26.3 percent of general education students took a science class that year. By the last year of school, only 11.0 percent of vocational students were enrolled in a science class, compared to 47.4 percent of general education and 45.0 percent of college preparatory students.

These results indicate that vocational students are not being exposed to areas such as mathematics, English, science, social studies, and foreign languages to the same extent that college preparatory students are, although in many cases they receive more exposure than general education students do. It can perhaps be argued that vocational students have a reduced need for familiarity with some of these subject areas (e.g., foreign languages), but the lack of exposure to the other areas needs to be offset either in the vocational classroom or work site if these students are to attain the functional levels of basic skills proficiency that they will need to be employable in the future.

School Grades

Approximately 50 percent of the college preparatory students described their grades as mostly Bs or better, compared to 27.7 percent of the vocational and 8.7 percent of the general education students. This finding may help to explain some of the differences between these groups concerning their perceptions of the school environment and their achievement scores.

Students' Use of Discretionary Time

Students were asked to indicate the average amount of time they spent working on homework every week during the school year. Among vocational students, 5 percent reported that no homework was ever assigned to them, whereas less than 2 percent of the college preparatory and general education students made such a response. On the other hand, 12.1 percent of the general education students reported that although they were assigned homework, they did not do any; the corresponding figures for vocational and college preparatory students were 5.9 percent and 1.2 percent, respectively. On the whole, college preparatory students reported spending more hours per week on homework than did students in the other 2 school programs; 50.1 percent reported spending more than 3 hours a week on homework, whereas 33.1 percent of the vocational and 27.6 percent of the general education students indicated spending that same amount of time.

On a related topic, students were also asked to indicate how many hours per weekday they spent watching television. Among general education students, 25.8 percent reported watching 4 or more hours of television each weekday, compared to 23.8 percent of vocational and 15.5 percent of college preparatory students.

The data concerning time spent on homework and time spent watching television indicate that the results tend to be negatively correlated. The more time spent watching television, the less time spent on homework. Although among general education and vocational students part of the responsibility for the greater amount of time spent on television may lie with the parents of these students, school administrators may want to consider steps to ensure that students in these programs are assigned and required to complete homework assignments of a level comparable to that of college preparatory students. Basic skills cannot be acquired without practice on the part of the student, the nominal purpose of homework. Means must be devised to make homework tasks relevant to the interests of the students while at the same time stressing the learning and application of basic skills. Vocational students, for example, could possibly learn mathematical skills in a context that makes sense for them by relating the homework assignment to an applied vocational setting, that is, performing business-related math problems concerned with the operation of a machine shop, clerical office, and so forth.

Part-Time Work

Vocational students were more likely to be working at a part-time job during the school year. Among the vocational students, 90.3 percent reported holding part-time jobs at the time of the interview; 86.1 percent of the general education students and 76.8 percent of the college preparatory students reported having a part-time job.

Vocational students were also more likely to work 35 or more hours per week at their part-time jobs. Among vocational students, 10.3 percent reported working at least 35 hours per week, compared to 5.6 percent of the general education and none of the college preparatory students. College preparatory students who were employed were more likely to work less than 15 hours per week (26.8 percent) in comparison to vocational (14.4 percent) and general education students (13.9 percent). The results indicated that vocational students spent a proportionally greater amount of time in work situations than did students in other school programs. Since time spent in school (for vocational co-op students) and time available for study (for all vocational students) is less than that for students in other programs, school administrators need to be concerned that time spent at the co-op work site helps teach students basic skills. Co-op job placements should provide incentive to the student to increase the basic skills that are relevant to that particular job situation, as well as the basic skills that will be useful in providing the student with a variety of future vocational options.

Skill Demands in the Learning Environments

The purpose of collecting data from observations of students in classrooms and work sites was to assess differences between school programs (vocational nonco-op and vocational co-op--classroom and work site components, college preparatory, and general education) in terms of the presence of factors listed in table 1. By design, the observational factors were divided into three fundamental groups:

- o Basic skills factors--intended to measure the differential patterns of exposure to various basic skills (e.g., reading, math, and speaking) as a function of participation in a particular school program or setting.

- Attentional factors--intended to assess a student's level of cognitive involvement with data, people, and things.
- Environmental factors--intended to assess characteristics of environments in which observations took place.

The findings will be discussed by assessing the differences between school programs and settings in relation to the proportion of task episodes that contained some observable level of each factor and the overall mean level of each factor observed in each program or setting. A more exhaustive presentation of the findings from the observation data is presented in appendix C.

Basic Skills Factors

- Language arts skill demands (except for speaking) are lower for vocational students than for college preparatory students.
  - --Vocational co-op work sites require the lowest level of overall language skills of all groups.
  - --Vocational co-op work sites require the lowest exposure to and level of reading skills of all classes.
  - --Vocational co-op work sites require the lowest exposure to writing skills of all classes, but all vocational programs do require a higher or similar level of writing skills.
- Speaking skill demands are higher for vocational students than for academic* students.
  - --All vocational programs require greater exposure to speaking skills than "academic" programs do.
  - --All vocational programs require a higher level than, or same level of speaking skills as academic programs do.
  - --Vocational co-op work sites require the highest level of speaking skills.

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*The designation of academic is used as a term of convenience to refer to both college preparatory and general studies programs, that is, nonvocational programs.

- Vocational students have a higher exposure to, but lower level of mathematic skill demands than do academic students.

  --Vocational programs, especially at the work site, require a greater exposure to mathematics skills than academic programs do.

  --Vocational programs, especially in classrooms, require a lower level of mathematics than academic programs do.

Discussion

The observations on the basic skills data revealed a complex interaction between school program, setting, and particular skill (see table 8). As might reasonably be expected, no single school program or setting was superior to the others in the demand for or exposure to levels of all basic skills. However, the college preparatory program had the highest frequency of exposure to basic skills and the highest level of usage of those skills actually demonstrated by the students. This result was particularly true with reading skills. The college preparatory program produced the highest frequency of task episodes in which some level of reading was observed and the highest level of mean skill usage.

In other instances the differences between the programs were not so clear-cut. With language skills, for instance, although college preparatory students performed at the highest mean level of skill usage and vocational co-op work site students at the lowest, there was no significant difference between any of the programs or settings in frequency of exposure to some level of this variable.

TABLE 8

SUMMARY OF THE MAJOR FINDINGS - BASIC SKILL FACTORS

	Language Arts Skills								Mathematics	
	Overall Language		Reading		Writing		Speaking			
	Exposure	Level	Exposure	Level	Exposure	Level	Exposure	Level	Exposure	Level
Vocational Nonco-op						Higher or equal to acad.	Higher than acad.	Higher or equal to acad.	Higher than acad.	Lower than acad.
Vocational Co-op Class						Higher or equal to acad.	Higher than acad.	Higher or equal to acad.	Higher than acad.	Lower than acad.
Vocational Co-op Work Site		Lowest	Lowest	Lowest	Lowest	Higher or equal to academic but lower than voc. class	Higher than academic and other class	Higher or equal to academic Higher than class	Higher than acad. and other class	Lower than acad. but higher than voc. class
College Preparatory		Highest	Highest	Highest	Highest					
General Education										

NOTE: Only significant differences are reported.

In two instances, vocational programs demonstrated a *higher* frequency of exposure to math and speaking skills than the more academically oriented programs did. Although the level of math used by vocational students was lower, on the average, than that observed in the academic programs, the level of speaking and writing skill usage in vocational education was either superior to or at least equivalent to that observed in the college preparatory and general education programs.

A final point regards the relationship between the settings in which vocational co-op students were observed. In two instances (reading and writing skills) the classroom setting demonstrated a clear margin of superiority over the work site both in frequency of exposure to the reading and writing skills and the average level of skill usage observed. In two other instances (math and speaking skills), the situation was exactly the opposite with the work site demonstrating a clear advantage. Regarding the effect of work site experience on exposure to basic skills, it seems clear that the presence or absence of a particular basic skill and the level with which it is exercised should be largely determined by the particular work situation in which a student is involved. However, our results clearly indicate an advantage for the work site over the classroom for exposure to and level demanded of math and speaking skills.

Attentional Factors

- Data demands are lower for vocational students than for academic students.

  --Although the frequency of data requirements are the same for all students, vocational programs, especially at the work site, require the lowest data skill levels.

  --The college preparatory program requires the highest data skill levels.

- The level of involvement with people skills is greatest in the vocational nonco-op and co-op work site programs.

  --Vocational nonco-op programs require the highest frequency of involvement with people.

  --Vocational co-op work sites require the highest level of people skills.

  --Academic and vocational co-op classroom programs require less people skill demands than the other programs.

- The percentage of people involvement compared to data and things involvement is lower for vocational students than for academic students.

  --Vocational programs, especially the classroom component of co-op, had a lower percentage of people involvement (compared to data and things) than programs for academic programs did.

  --Vocational programs, except for the co-op work site component, had a lower level of orientation to people than the academic programs did.

- Demands for involvement with things are higher for vocational students than for academic students.

  --Vocational programs, especially the work site component, had a greater frequency and level of involvement with things than academic programs did.

Discussion

Six attentional factors were included in the observation methodology to assess students' level of cognitive involvement with data, people, and things. The individual attentional variables were analyzed according to two global categories:

- o Data, people, and things _function_ variables, which indicate the level of involvement displayed by a student with regard to the three separate foci of attention
- o Data, people, and things _orientation_ variables, which assess the relative percentage of students' involvement with each of the individual variables in contrast to the other two.

However, because of the similarity of results across the two categories, data, people, and things will be presented as separate dimensions in relation to their occurrence in the various programs and settings.

First, there was no significant difference between any of the programs in frequency of exposure to data, indicating that exposure to data at some level is evenly distributed across programs and settings (see table 9). However, systematic differences between settings in intensity levels of both factors were observed. The college preparatory classroom showed the highest mean levels of data function and data orientation, whereas in both cases the vocational co-op work site showed the lowest. There is perhaps little surprise in this particular result since it may seem reasonable to expect that greater demands would be placed on college preparatory students concerning the level of information, ideas, and facts that are employed. However, the fact that the vocational co-op work site setting required very low

TABLE 9

SUMMARY OF MAJOR FINDINGS - ATTENTIONAL FACTORS

		Data				People				Things			
Program		Function		Orientation		Function		Orientation		Function		Orientation	
		Freq.	Level	Freq.	Level	Freq.	Level	Freq.	Level	Freq.	Level	Freq.	Level
Vocational Nonco-op		Same		Same		Highest							
Voc. Co-op	Class	Same	Higher than work site but lower than other class	Same	Higher than work site but lower than all classes	Lowest	Lowest	Lowest	Lowest				
	Work site	Same	Lowest	Same	Lowest		Highest		Same as acad.	Higher than all other vocational education and all academic			
College Preparatory		Same	Highest	Same	Higher than all voc.ed.			Higher than all voc. ed.	Higher than all voc. ed. but work site	Lower than all vocational education			
General Education		Same		Same	Higher than all voc.ed.			Higher than all voc. ed.	Higher than all voc. ed. but work site	Lower than all vocational education			

NOTE: Only significant differences are reported.

data demands indicates that the type of work involved was not heavily oriented toward abstract or cognitive tasks. It also indicates that the observed deficit in the work site will have to be made up in the vocational co-op classroom. Our results indicate that particularly in the case of the _level_ of information, ideas, and facts required, this compensation is not being accomplished. Although the vocational co-op classroom made greater data demands on students than the vocational co-op work site did, it nevertheless lagged far behind the other classroom settings.

For the attentional measures related to people, the trend is somewhat less clear. The vocational co-op classroom ranked lowest in frequency of exposure to and mean level of both people function and orientation. This result indicates a deficiency in this regard that is even more pronounced than that observed with the data variables. The vocational nonco-op classroom showed the greatest frequency of exposure to people function, indicating a greater _amount_ of interpersonal interaction in that setting as opposed to the others. However, the highest level of people function was observed in the vocational co-op work site, indicating that a more sophisticated degree of personal interaction existed in the workplace than in the scholastic environment. Regarding the people orientation measure, or the relative percentage of involvement with people as opposed to data or things, the college preparatory and general education classroom settings showed the highest frequency _and_ mean level. The vocational co-op work site was not significantly different from these two, however, in the level of people orientation observed. Therefore, it seems, that the quality of personal interaction observed in the work site may serve to offset at least partially the deficits observed in the vocational co-op classroom on this factor.

Finally, regarding attentional measures related to things, the vocational co-op work site setting demonstrated both a higher frequency of exposure to and a higher mean level required of both the function and orientation factors. The college preparatory and general education programs were generally lowest on all measures relevant to these factors.

In general, the findings of the observation data regarding the attentional factors seem to offer support for the idea that work site experience may be of great value to all students and particularly to vocational students. Although the nature of some of the jobs in the sample may have been such that attention to data is minimized at the work site, this feature may be partially offset by an advantage in terms of people and thing attentional measures.

Environmental Factors

o The learning environments of vocational co-op work site students are far more complex than those of students in vocational or academic classrooms.

--Co-op students at the work site performed significantly more tasks necessary, before others could carry out their own than did classroom-based students.

--Co-op students in class and at the work site performed more self-initiated tasks than did college preparatory and general studies students whose tasks were more teacher directed. However, co-op students performed a high proportion of routine and repetitive tasks.

- --Co-op students at the work site were required to carry out the widest variety of tasks and cope with the most interruptions in coordinating tasks, but the lowest number of simultaneous tasks.

- --Co-op students at the work site rated their activities higher in terms of importance to themselves, others, and the organization than did students in classroom settings, especially academic ones.

o Vocational students had less autonomy, self-direction, and feedback in carrying out their tasks than did academic students.

- --Vocational programs, especially in the classroom, provided significantly lower autonomy in task execution than did academic programs did.

- --Vocational programs, especially at the work site, engaged students in more highly prescribed tasks than academic programs did.

- --The vocational co-op classroom component provided less feedback than college preparatory (the highest), general studies, and the vocational work site component did.

Discussion

The intent of this area of the study was to examine whether the school programs and settings exhibit different patterns of exposure to and overall level required of environmental factors. There seem to be some clear-cut advantages and disadvantages of vocational education as a whole, as well as the settings in which vocational education occurs. On the positive side, the vocational co-op work site setting showed by far the highest number of major task episode categories per observation; in fact, more than twice as many as were observed in the vocational co-op classroom setting (see table 10) than in the next highest setting.

TABLE 10

SUMMARY OF MAJOR FINDINGS - FREQUENCY OR LEVEL OF ENVIRONMENTAL FACTORS

	Articulation	Initiation (Frequency)		Task Episodes (Frequency)			Other Factors (Mean Level)				
		Self	Teacher	Freq	Split	Simul-taneous	Impor-tance	Autonomy	Pre-scribed	Student discretion	Teacher/ supervsr feedback
Voc. Nonco-op								Lowest			
Voc. Co-op Class		Highest	Lowest			Highest		Lowest			Least
Voc. Co-op Work site	Highest	Highest	Lowest	Highest	Lowest		Highest	Lower	Higher	Lowest	Higher than voc. co-op class
College Prepara-tory			Highest		Highest		Lowest	Higher	Less		Most
General Educa-tion			Highest				Lowest	Higher	Less		

NOTE: Only significant differences are reported.

On the other hand, the college preparatory and general education programs showed the lowest number of major task episode categories per observation. If nothing else, this finding indicates that vocational students in the work site setting were being exposed to an environment that, first of all, reflected a true work site situation and, second, demanded numerous shifts in attention during a given time span. Since our findings indicate that the classroom was a far less complex environment in this respect, it seems that the work site setting may be the environment of choice in which to accustom students to the complexities (in terms of shifting attention) involved in the working environment.

The vocational co-op work site also produced a greater frequency of exposure to articulation, the factor that assessed the degree to which a student's performance of a task was necessary for other students or workers to carry out their own. The difference between the work site and classroom in frequency of occurrence of this factor was very striking (35 percent of task episodes at the work site as opposed to 9 percent for the classrooms). The vocational co-op classroom scored even lower than the average for the other classes (i.e., 7 percent). This finding indicates that the requirement of understanding the relationship between one's own work and that of one's fellow workers was not being sufficiently addressed in the vocational classroom. A properly configured work site program would seem best suited to developing this type of knowledge on the student's part.

Regarding the initiation of task episodes, the highest proportion of self-initiated task episodes was found in the vocational co-op classroom and work site settings; in the college preparatory and general education programs, the teacher initiated most task episodes. There are, however, positive and negative aspects of these findings. It is a plus for the vocational classroom to have a higher proportion of nonrepetitive self-decisions than in any other classroom. This finding indicates that students are given somewhat more independence to decide which tasks to initiate. However, the high proportion of routine or repetitive self-decisions combined with a very low proportion of supervisor-initiated task episodes for the vocational co-op work site is not encouraging. This finding may reflect the particular types of work site environments in which the students in our sample were placed. It should alert educators to the questionable educational merit of placing their students in a work environment in which the tasks are repetitive and educationally meaningless (e.g., flipping hamburgers) and the supervisor input is low.

The highest mean level of coordination was found for the vocational co-op work site. This factor was meant to assess the degree to which students were required to carry out a wide variety of tasks, cope with interruptions, and perform more than one task at a given time. The work site setting was lowest in the mean number of split tasks per observation, and also ranked very low in the number of simultaneous tasks per observation. The high rating it received on this factor, therefore, probably resulted from the significantly greater number of major task episode categories that were required at the work site. As such, this factor serves to reinforce the finding that greater demands are placed on the student in the work site to attend to a greater number of things in a period of time comparable to that observed in the classroom.

The vocational co-op work site setting also resulted in the highest mean level of importance in comparison to the other settings observed. This finding indicates that at the work site, as compared to the classroom, students are engaged in activities that were judged to have some significant impact on their own lives, those of other people, or the organization. The college preparatory and general education classroom settings resulted in the lowest mean values of importance. The relevance of this particular finding is that the greater importance attached to successful task completion in the work environment may greatly add to the face validity of such a setting. In the classroom, on the other hand, students all too often complain that the tasks they are assigned to carry out seem meaningless and represent abilities that they will never need to use in the real world. In spite of the highly questionable assumptions underlying that typical complaint, these data indicate that educators may be able to exploit the greater degree of importance attached to task episodes in the work site as a vehicle for increasing basic skills competency. For example, tying basic skills instruction to concrete tasks on the job may prove to be a more effective educational vehicle than academic exercises in isolation.

On the negative side, the vocational programs were significantly lower than the college preparatory and general education programs in the mean level of autonomy observed. This factor, intended to assess the degree of flexibility a student had in carrying out a task, indicated that vocational programs seemed to emphasize limiting the number of ways a student could approach a task. This tendency was more pronounced in the classroom than in the work site. In many situations in vocational education, it may, for reasons of safety, be important to restrict the range of student experimentation, e.g., operating potentially dangerous machinery. However, nearly all theories of learning (cf., Bower and Hilgard 1981) emphasize the importance of variation and experimentation for effective learning and subsequent retention of material. Vocational educators may wish to consider allowing their students greater flexibility in accomplishing their tasks in situations where it is safe to do so.

The factor of instruction, which was also included to assess the proportion of student discretion and prescription in completing a task, replicated the finding that college preparatory and general education environments were less highly prescribed. The vocational co-op work site setting resulted in the lowest mean level of student discretion. This finding indicates that the tasks themselves were perhaps so one-dimensional that individual discretion in performance of the task was meaningless. Or it could also indicate that the employers were emphatically concerned with communicating the "right way" of doing things--as is ofteh typical in many apprenticeship programs--at the expense of allowing students to experiment and discover on their own. Once again, the point bears repeating in this context that learning and retention are most effective when material is presented in different contexts with students exerting some control over the situation.

Finally, the college preparatory classroom appeared to provide the most opportunity for teacher/supervisor feedback; the vocational co-op classroom afforded the least. The somewhat higher frequency and level of feedback in the vocational co-op work site may help to offset the low levels observed in the vocational co-op classroom. Theories of learning since Thorndike's (1911) Law of Effect have emphasized the overriding importance of consistent, frequent feedback in the acquisition and retention of desirable behaviors and/or concepts. In light of the acknowledged importance of feedback for learning, it would seem that all the programs and settings in this study showed a surprisingly low level of this factor.

Perceptions of Learning Environments

Overview

The Classroom Environment Scale (CES), which measures student perceptions of the school environment, was administered to 325 students, 83 of whom were in the college preparatory program, 105 in the general education program, 89 in the vocational nonco-op program, and 48 in the vocational co-op program. The results of the administration of the CES indicated no significant effect of student race or gender on scores for any of the nine CES subscales listed in table 4. These results indicate that for our particular sample, race and gender were not meaningful discriminators between students' perceptions of the school environments.

Of the 163 students who completed the Work Environment Scale (WES), which measures student perceptions of the work setting, 120 were vocational co-op students who had school-sponsored jobs and 43 were students in other school programs who held non-school-related part-time jobs. A significant difference between races was found for ratings on the peer cohesion subscale (see table 5). White students rated their work environment higher on this subscale than did black students. This rating indicates that the former group perceived their fellow employees as being more friendly and supportive on the job than did the latter group. The two races produced essentially identical scores on the other nine WES subscales.

Significant gender differences were found for the four WES subscales of involvement, peer cohesion, task orientation, and rule clarity. Female students rated their work environments significantly higher than did male students on all four subscales. This rating indicates that female students felt more commitment toward their jobs; perceived more support and friendliness among their fellow employees; reported greater efficiency and rate of completion of work; and perceived more clarity in the rules, policies, and layout of their daily routine.

Appendix B contains a detailed presentation of the findings from both the CES and WES.

Findings

- Vocational co-op students perceived their classrooms as being lower on affiliation than did college preparatory students.

  --College preparatory students perceived higher levels of friendship among themselves than did vocational co-op students.

  --College preparatory students expressed a greater willingness to help each other with homework than did vocational co-op students.

  --College preparatory students expressed greater enjoyment in working with each other than did vocational co-op students.

- College preparatory and vocational nonco-op students perceived their classrooms as being higher on teacher support than did vocational co-op students.

  --College preparatory and vocational nonco-op students perceived higher levels of help, concern, and friendship on the part of their teachers than did vocational co-op students.

- College preparatory students perceived their classrooms as being higher on order and organization than did vocational co-op students.

  --College preparatory students perceived a higher level of politeness and orderliness in the classroom than did vocational co-op students.

- Vocational nonco-op students perceived their classrooms as being higher on teacher control than did college preparatory students.

  --Vocational nonco-op students perceived their teachers as stricter in enforcing rules than did college preparatory students.

  --Vocational nonco-op students perceived the punishment incurred for rule infractions as being more severe than did college preparatory students.

- Vocational co-op students perceived their work environments as being higher on involvement than did students who held part-time jobs not related to school.

--Vocational co-op students perceived themselves as being more concerned about and more committed to their jobs than did students who held non-school-related part-time jobs.

Discussion

There were significant differences between school programs on four of the nine CES subscales (see table 11). Students in the college preparatory and vocational co-op programs differed significantly from one another on the subscale measuring affiliation. College preparatory students perceived higher levels of friendship among themselves--including a greater willingness to help each other with homework--and expressed greater enjoyment in working with each other than did vocational co-op students.

College preparatory students also rated their classrooms significantly higher in terms of order and organization than did vocational co-op students. College preparatory students evidently perceived a higher level of politeness and orderliness in the classroom than did vocational co-op students.

Finally, both college preparatory and vocational nonco-op students rated their classrooms significantly higher on the subscale measuring teacher support than did vocational co-op students. Students in the college preparatory and vocational nonco-op programs perceived higher levels of help, concern, and friendship on the part of their teachers toward students than did vocational co-op students. In fact, vocational co-op students

TABLE 11

SUMMARY OF MAJOR FINDINGS OF THE CLASSROOM ENVIRONMENT SCALE

	Subscales								
Program	Involvement	Affiliation	Teacher Support	Task Orientation	Competition	Order and Organization	Rule Clarity	Teacher Control	Innovation
College Preparatory		Highest	Highest			Highest		Lowest	
General Education									
Vocational Education Nonco-op			Highest					Highest	
Vocational Co-op		Lowest	Lowest			Lowest			

NOTE: Blank columns indicate that no significant differences were found across programs for that subscale.

rated their classroom environments lower on virtually every subscale contained in the CES than did students in other programs, although the highly negative effects of a particular department store marketing class may have served to depress the mean ratings of the vocational co-op program as a whole (see appendix B). Nevertheless, these results offer strong evidence that vocational students seem to perceive their educational environment in a far more negative fashion than students in academic programs. Vocational educators may be well advised to concentrate on creating a more supportive, caring, and helpful learning environment if these students are to become competitive with academic students in basic skills achievement.

Vocational co-op students generally rated the work environment higher than students from other programs who held part-time jobs. However, vocational co-op students' ratings were *significantly* higher than other students' on only one WES subscale, that measuring involvement. This result indicates that vocational co-op students perceived themselves as being more concerned about and more committed to their jobs than were students in other programs who held non-school-related part-time jobs. Although on comparable subscales there was little difference between vocational co-op students' perceptions of the school and work environments, the fact that these students show a higher level of commitment on the job indicates that this environment may be used to advantage in the communication of basic skills.

Basic Skills Achievement

The basic question that was addressed using the achievement data collected during the project was What students learn what basic skills in what settings? In relation to this question, the highlighted (italicized) components were made operational as follows:

- What students--Individual differences among students were delineated for three demographic variables (sex, ethnicity, and a proxy for socioeconomic status), school grade or grade level, and 12 other student characteristics (program self-report, how far in school do you think you will go?, grades, hours per day spent watching TV, had a part-time job that was not school-related?, had a part-time job during 1984-85 school year?, average time spent on homework per week, perception of degree to which school fosters/allows independent action/activity, number of leadership activities in which a leadership role was pursued, number of extracurricular activities participated in; number of vocational courses taken, and number of academic courses taken).

- What basic skills--Mathematics and reading achievement represented the basic skills upon which data were collected.

- What settings--Settings were defined in terms of the schools in which students were located, the programs (by title and administrative organization) in which they were enrolled, and the classes within school-program combinations to which they were assigned.

The evaluation of various interrelationships among these components that were implied by the preceding question was undertaken via a series of hierarchical regression models and related descriptive procedures. For a more complete presentation, see appendix D.

Findings

The application of the indicated procedures led to the following general findings:

- o Overall, for students as a group (across settings), both mathematics and reading achievement (1) increased slightly from the fall to winter testing and then (2) decreased from the winter to spring testing. Although several alternative explanations could be offered for this observation (e.g., the sample of students decreased during the year and hence the sample upon which the finding is based changed appreciably or the students became bored with the test and did not "try as hard" during the spring as they had during the fall and winter), at this point the feasibility of potential alternatives has not been evaluated and their relative validities established (given the constraints of the current database).

- o With regard to the issue of what student characteristics are related to changes in basic skills in different settings, it appears that--

  --no consistent relationships exist between the selected demographic characteristics and basic skills achievement. Even though the winter-to-spring math scores of females decreased less than those of males, and the corresponding scores for minority students decreased more than those of the other students, these findings are not consistent across basic skills or testing sessions. In addition, they accounted for a relatively small proportion of the variance in the criteria, even the math scores for which statistically significant effects were noted.

  --grade level is negatively related to the changes in both mathematics and reading achievement observed from winter to spring. More specifically, the decreases in achievement between those two testing sessions (which were noted earlier) were greater for 12th-grade students than they were for 11th-grade students. One potential explanation for this outcome might be a differential decrease in interest or motivation experienced by the 12th-graders as they approach the end of their high school careers.

  --the most consistent relationship existing between the other student characteristics and basic skills achievement involves the students' current marks in school. More specifically, the increases in achievement from fall to winter (particularly for reading) appear to be greater for those with higher marks and the decreases in achievement from winter to spring appear to be less for students with higher marks than for those with lower marks. Although significant effects were observed for several other student characteristics, those effects were not consistent across basic skills or testing sessions.

- With regard to the issue of how settings are related to students' basic skills achievement, it would appear that--

  --the school in which students are enrolled is very critical to basic skills achievement. School effects consistently accounted for large proportions of the variance in achievement. The variance accounted for by schools was particularly large for the decreases that occurred between the winter and spring testing sessions.

  --consistent relationships exist between programs and basic skills achievement. In particular, regarding both mathematics and reading achievement, the performance of the academic students was better than that of the vocational (co-op and nonco-op) students (although the effect was not significant for changes in reading from winter to spring). Also, the achievement of the general students between fall and winter increased somewhat more (significantly so in the case of reading) than the achievement of the vocational students from winter to spring. As a result, the net difference in achievement between students in the two programs did not change appreciably over the school year. In regard to the co-op and nonco-op programs, the major difference occurred in reading achievement; namely, the co-op students scored better in the winter and the nonco-op students scored better in the spring, resulting in a net difference of approximately zero between the two groups.

  --the effect of classes to which students are assigned, like that noted earlier for schools, is very important to basic skills achievement. In all but one of the analyses, this effect was significant, and in all cases it accounted for a sizable portion of the variance in students' criterion scores. This finding suggests that in future efforts such as the current project, effects should probably be more explicitly addressed and controlled during both the project design and analysis phases. It also suggests that different teachers may employ different strategies in their classrooms that are differentially effective in enhancing and reinforcing students' basic skills.

Discussion

Generally, these findings tend to reconfirm several commonly held perceptions rather than suggest any major discoveries. Overall, they suggest the following:

- Students' basic skills achievement tends to taper off during their senior year in high school (especially during the last half of the senior year), whereas it tends to increase during previous years.
- Students who earn higher grades in school (whether they are seniors or not) generally score higher on achievement tests than do students who earn lower grades (i.e., grades are positively correlated with achievement test results).
- The relationships between changes in basic skills achievement and various individual differences among students tend to be complex and somewhat equivocal or inconsistent across studies.
- Students in academic programs exhibit higher achievement scores and more positive changes in those scores than do students in either vocational or general programs, who score at approximately the same levels.
- Attempts to address differences in students' basic skills achievement over time can be attributed to the sizable differences that exist among school and classroom "settings."

Summary

The most significant factors involved in the changes observed in basic skills achievement over the course of the year appeared to be most directly related to school program, school classroom, and school building. Results from the previously discussed topics (observation data, environment scales, and student interview data) provide a great deal of evidence strongly suggesting that what goes on in the school building and classroom and within the school program, in combination with students' perceptions of their educational environment, may help to explain these effects.

Although effects resulting from individual demographic differences are complex and individually accounted for very little variance in the achievement test data, the effects of observed environmental differences between programs and perceived differences toward school and work environments among students in the four school programs suggest several possibilities for improving basic skills performance by vocational students. For example, the results of the CES indicated that vocational co-op students perceived their school environments in a more negative fashion than did students in other programs across nearly every subscale. Under the assumption that the perceived instructional environment strongly influences learning, these results emphasize the need for school administrators to closely monitor the nature of their vocational classroom environments in order to approximate more closely the types of environments in which basic skills acquisition is better accomplished.

The results of the observation and student interview data suggest that the work site may be a potentially valuable setting in which to bring vocational students' basic skills competency up to a level closer to that of their academic counterparts. Tasks carried out on the work site tend to be perceived by vocational students as having greater face validity in terms of the meaningfulness and utility of the results of tasks performed there than tasks carried out in school. If basic skills instruction can be carefully coordinated with job performance requirements, it may be reasonable to expect that vocational students will begin to more readily appreciate the relevance of basic skills competency to future career success.

Finally, the work site exposed students to higher levels and higher frequency of exposure to various basic skills (e.g., math and speaking skills) than did the school environment. This finding suggests that careful placement of vocational students in appropriate work situations may, in some instances, be more productive than time spent in school. However, a job placement in an educationally impoverished work environment (e.g., being a maid in a hotel) may have highly negative effects.

Recommendations

Our findings seem to indicate that all educational programs have something to learn from each other with respect to providing basic skills to students. Our perspective is that there are multiple pathways for students to acquire basic skills and that students should be encouraged to take advantage of alternative ways to learn basic skills. For the vocational programs, we offer the following recommendations:

- Increase both the exposure to and the level of reading skills required for vocational students.
- Increase the demand for the level of mathematics skills that vocational students use in completing tasks.
- Increase the vocational students' involvement and intensity with activities requiring the use of data.
- Increase vocational students' opportunities for autonomy, self-direction, and feedback.
- Create a more caring and supportive learning environment to help students perceive vocational education classes more positively.

For the academic programs, we offer the following recommendations:

- Increase both the exposure to and the level of speaking skills.
- Increase the opportunities for students to use manipulative skills
- Diversify the following environmental factors in the classroom:
  - --variety
  - --self-initiation
  - --coping with changes in the environment
  - --increasing the significance of the task for the student

These recommendations are offered with the realization that not all the data have been analyzed for this report and that future analyses and findings may, in fact, change the recommendations. Also, the reader is reminded that the data were obtained from a single urban city and, therefore, the recommendations may not be generalizable to all educational programs and settings. Finally, the reader is cautioned that the vocational programs included in this study were primarily business and office and marketing education programs and, as such, the recommendations may not apply as directly to other vocational areas. During Year IV of the National Center grant, the project will conduct additional analyses and include an examination of achievement data secured after the students' summer vacation in order to address the issue of the retention of basic skills.

APPENDIX A

STUDENT CHARACTERISTICS

Introduction

Students who participated in this study were interviewed during the latter half of the school year in which the study was conducted. The interviews had two objectives. First, the study needed to obtain a broad measure of activities in and out of the school and workplace environments; the second objective was to assess students' attitudes about various aspects of their school and part-time job experiences. (A sample of the interview form is attached at the end of this appendix.) The questions included in the interview were intended to assess students' participation in activities such as part-time jobs, school course activities, extracurricular activities, and various nonschool and nonwork related activities such as hours spent watching television. A total of 381 students were interviewed.

The results of a descriptive analysis of the data will be presented in approximate correspondence with the order in which the questions appeared on the interview form. However, in order to facilitate comparisons, the results of the interview questions related to students' attitudes about their job and/or school environment will be presented last.

Results

Results will be presented in two ways. First of all, descriptive statistics will be presented for all students as a single group regardless of their membership in a particular school program. Secondly, results will be presented in terms of school program membership. For purposes of this appendix, membership in a school program will be defined by the student's own self-report on the interview--either college preparatory, general education or vocational. Of the 381 students interviewed, 239 (62.7 percent) reported that they were vocational students, 84 (22.1 percent) were college preparatory students, and 58 (15.2 percent) were general education students. Results summed across school programs will, therefore, disproportionately reflect the responses of vocational students. The subsequent presentation of findings for each school program is intended to clarify differences in the responses to the interview by vocational and academic students.

Part-Time Work

Of the 381 students interviewed, 287 (75.3 percent) reported having held a part-time job at some point during the school year in which the interview took place (September, 1984-June, 1985). Among the vocational students, 195 (81.6 percent) reported having held part-time jobs, whereas 56 (66.7 percent) of the college preparatory and 36 (62.1 percent) of the general education students had also held part-time jobs during that period.

Among those students having held part-time jobs during the school year, 250 (87.1 percent) reported that they were currently employed, whereas 37 (12.9 percent) indicated that they were not. Among the vocational students, 176 (90.3 percent) were employed, whereas 43 (86.1 percent) of the general education students and 31 (76.8 percent) of the college preparatory students still held part-time jobs.

When asked if their job was or had been part of their formal school program (e.g., co-op job or a job earning academic credit for work experience), 124 (43.2) of the students in the sample reported that their jobs were not connected with school, whereas 163 (56.8 percent) reported that theirs were. Of the 163, 139 (71.3 percent) of the vocational students reported participating in jobs that were part of their school program, whereas 13 (36.1 percent) of the general education and 11 (19.6 percent) of the college preparatory students indicated that their job had also been part of their school program.

Students were also asked to report the hourly wage that they earned at their job. The average hourly wage for all students was $3.56 per hour. For the general education, college preparatory, and vocational students, the average hourly wages were $3.66, $3.15, and $3.61 per hour, respectively.

When asked what type of employer they worked for, 287 students responded. Of that number, 28 (9.8 percent) reported that they worked for a private company or business; 247 (86.1 percent) reported that they reported for a private company; 5 (1.7 percent) reported that they worked for a nonprofit organization (e.g., church or charity organization), and 7 (2.4 percent) reported that they worked for a neighbor or friend. Table A-1 presents the type of employer worked for in terms of each of the school programs and number of responding student employees. These data indicate that the distribution of students across types of employer is approximately the same for all school programs. In our sample, however, proportionally fewer vocational students were employed by private companies as compared to students in the academic programs. Government was the second leading employer of students, employing a higher percentage of vocational as compared to academic students.

Students were asked to indicate the approximate length of time during which they had been employed. The number and percentage of students responding who had been working for different periods are as follows:

- 32 (11.1 percent)--less than 1 month
- 23 (8.0 percent)--from 1 to 1.9 months
- 34 (11.8 percent)--from 2 to 3.9 months
- 28 (13.2 percent)--from 4 to 5.9 months
- 71 (24.7 percent)--6 to 8.9 months
- 42 (14.6 percent)--from 9 to 11.9 months
- 44 (15.3 percent)--12 months or more
- 3 (1.0 percent)--period unknown

Table A-2 presents the number of students in each school program according to the length of time they had held their part-time job. These data indicate few differences between the school programs, although a proportionally higher number of college preparatory and general education students had held their jobs for 1.9 months or less (25 percent in both cases) than was the case with the vocational students (16.4 percent). One large difference between the programs on this measure is reflected in the finding that 28.6 percent of college preparatory students had been employed for 12 months or more, whereas only 13.9 percent of the general education and 11.8 percent of the vocational students had been employed that long.

TABLE A-1

NUMBER OF STUDENTS BY TYPE OF EMPLOYER AND SCHOOL PROGRAM

Type of Employer	School Program General Education		College Preparatory		Vocational	
	N	%	N	%	N	%
Government	2	5.6*	3	5.4	23	11.8
Private company	34	94.4	51	91.1	162	83.1
Nonprofit organization	0		0		5	2.6
Neighbor or friend	0		2	3.6	5	2.6

*Percentages are derived from the number of students within a particular school program who held part-time jobs (N = 297).

TABLE A-2

NUMBER OF STUDENTS BY LENGTH OF EMPLOYMENT AND SCHOOL PROGRAM

Length of Employment	School Program General Education		College Preparatory		Vocational	
Less than 1 month	5	13.9	6	10.7	21	10.8
1 to 1.9 months	4	11.1	8	14.3	11	5.6
2 to 3.9 months	7	19.4	2	3.6	25	12.8
4 to 5.9 months	6	16.7	6	10.7	26	13.3
6 to 8.9 months	5	13.9	12	21.4	54	27.7
9 to 11.9 months	3	8.3	5	8.9	34	17.4
12 or more months	5	13.9	16	28.6	23	11.8
Do not know	1	2.8	1	1.8	1	0.5

Finally, students were asked to indicate the number of hours per week that they spent working at their part-time job. The number and percentage of students responding and the number of hours worked per week are as follows:

- 6 (2.1 percent)--1 to 4.9 hours
- 24 (8.4 percent)--5 to 9.9 hours
- 18 (6.3 percent)--10 to 14.9 hours
- 52 (18.1 percent)--15 to 19.9 hours
- 89 (31.0 percent)--20 to 24.9 hours
- 47 (16.4 percent)--25 to 29.9 hours
- 29 (10.1 percent)--30 to 34.9 hours
- 22 (7.7 percent)--35 hours or more

Table A-3 presents the number of students in each program according to the number of hours worked per week. These data indicate that vocational students were more likely to work 35 or more hours per week at their jobs. Of this group, 10.3 percent reported working at least 35 hours per week, whereas 5.6 percent and 0 percent of the general education and college preparatory students worked that many hours. College preparatory students who were employed were more likely to work less than 15 hours per week (26.8 percent) in comparison to vocational (14.4 percent) and general education students (13.9 percent).

Grades

Students were asked to describe their grades in school by ranking them in one of seven categories. Of the 381 students responding, the number and percentage and description of grades earned are as follows:

- 13 (3.4 percent)--mostly As
- 40 (10.5 percent)--half As and half Bs
- 60 (15.8 percent)--mostly Bs
- 95 (24.9)--half Bs and Cs
- 107 (28.1 percent)--mostly Cs
- 65 (17.1 percent)--half Cs and Ds
- 1 (0.3 percent)--mostly Ds or lower

Table A-4 presents the number of students in each program according to their self-reported grades. Approximately 50 percent of the college preparatory students described their grades as mostly Bs or better, whereas 27.7 percent of the vocational and 8.7 percent of the general education students classified their grades as such. On the other hand, 69 percent of the general education students described their grades as being mostly Cs or worse, whereas 46.4 percent of the vocational and 26.2 percent of the college preparatory students listed their grades as such.

Students were also asked to indicate the grade levels in which they had taken any of a variety of courses, including mathematics, English or literature, history or social studies, foreign languages, science, business or office, sales or marketing, trade and industry, technical courses, other vocational courses, and other elective courses. Table A-5 presents the

TABLE A-3

NUMBER OF STUDENTS BY HOURS WORKED PER WEEK AND SCHOOL PROGRAM

Hours per Week	School Program General Education N	%	College Preparatory N	%	Vocational N	%
1 to 4.9	0		2	3.6*	4	2.1
5 to 9.9	5	13.9	5	8.9	14	7.2
10 to 14.9	0		8	14.3	10	5.1
15 to 19.9	4	11.1	16	28.6	32	16.4
20 to 24.9	11	30.6	11	19.6	67	34.4
25 to 29.9	9	25.0	7	12.5	31	15.9
30 to 34.9	5	13.9	7	12.5	17	8.7
35 or more	2	5.6	0		20	10.3

*Percentages are derived from the number of students in a given program with part-time jobs (N = 287).

TABLE A-4

NUMBER OF STUDENTS BY SELF-REPORTED GRADES AND SCHOOL PROGRAM

Grades	School Program General Education N	%	College Preparatory N	%	Vocational N	%
Mostly As	1	1.7**	7	8.3	5	2.1
Half As and Bs	2	3.5	18	21.4	20	8.4
Mostly Bs	2	3.5	17	20.2	41	17.2
Half Bs and Cs	13	22.4	20	23.8	62	25.9
Mostly Cs	20	34.5	14	16.7	73	30.5
Half Cs and Ds	20	34.5	7	8.3	38	15.9
Mostly Ds or Lower	0		1	1.2	0	

**Percentages are derived from the number of students within a given school program (N = 381).

TABLE A-5

NUMBER OF STUDENTS BY COURSE TAKEN IN SPECIFIC GRADE LEVELS

Subject	Did Not Take		Grade 9		Grade 10		Grade 11		Grade 12	
	N	%	N	%	N	%	N	%	N	%
Mathematics										
Juniors		0*	163	97.6	159	95.2	106	63.5		0
Seniors	2	0.9	205	95.8	201	93.9	134	62.6	77	36.0
English or Literature										
Juniors		0	164	98.2	162	97.0	158	94.6		0
Seniors	1	0.5	208	97.2	207	96.7	207	96.7	193	90.2
History or Social Studies										
Juniors	2	1.2	48	28.7	157	94.0	158	94.6		0
Seniors		0	61	28.5	203	94.9	208	97.2	201	93.9
Foreign Language										
Juniors	34	20.4	110	65.9	93	55.7	38	22.8		0
Seniors	48	22.4	138	64.5	122	57.0	72	33.6	20	9.4
Science										
Juniors	1	0.6	159	95.2	150	89.8	68	40.7		0
Seniors	2	0.9	204	95.3	191	89.3	90	42.1	44	20.6
Business or Office										
Juniors	59	35.3	74	44.3	38	22.8	60	35.9		0
Seniors	52	24.3	65	30.4	56	26.2	110	51.4	113	52.8
Sales or Marketing										
Juniors	129	77.2	6	3.6	3	1.8	22	13.2		0
Seniors	124	57.9	7	3.3	4	1.9	16	7.5	75	35.1
Trade and Industry										
Juniors	143	85.6	9	5.4	4	2.4	8	4.8		0
Seniors	186	86.9	11	5.1	7	3.3	9	4.2	7	3.3
Technical Courses										
Juniors	140	83.8	3	1.8	5	3.0	12	7.2		0
Seniors	181	84.6	8	3.7	4	1.9	8	3.7	8	3.7
Other Vocational										
Juniors	115	68.9	5	3.0	7	4.2	38	22.8		0
Seniors	146	68.2	6	2.8	1	0.5	36	16.8	46	21.5
Other Electives										
Juniors	38	22.8	118	70.7	102	61.1	73	43.7		0
Seniors	51	23.8	150	70.1	141	65.9	117	54.7	79	36.9

number and percentage of students, summed across all programs, who indicated having taken a course at a particular level, or who indicated that they had not taken a course at all. The data are separated for juniors and seniors since juniors have obviously not been able to take any courses in Grade 12.

In terms of differences among the three school programs, first of all for juniors, a majority of students in all programs indicated that they had taken math in their first and second years of high school. However, in the third year, a majority (52.4 percent) of vocational students indicated that they did not take any math, whereas the majority of college preparatory (81.8 percent) and general education students (76.9 percent) did take it. The same trend emerged for seniors, although in this group the majority of vocational students continued to take math until the final year of high school, when 76.1 percent reported that they took no math. By comparison, 80.0 percent of the college preparatory and 42.1 percent of the general education students took math in their senior years.

For the most part, enrollment in English classes remained high for all school programs across all years in school. A majority (89.7 percent) of senior vocational students reported taking English in their senior year, whereas 92.5 percent of college preparatory and 89.5 percent of general education students also continued to take English through the final year of school. The data for juniors indicated a basically identical trend.

As depicted in table A-5, enrollment in social studies or History classes tends to be low in Grade 9, and then increases dramatically in Grade 10, remaining fairly constant throughout Grade 12. The trend is basically identical across all programs, although a higher percentage of college preparatory students enroll in social studies classes than do vocational or general education students. The latter group produced the lowest percentage enrollment in social studies for all 4 years.

Approximately 21.5 percent of all students reported never having enrolled in a foreign language course. This figure was particularly high for vocational students, 26.4 percent of whom had never enrolled in a foreign language course. By comparison, 22.4 percent of general education and 7.1 percent of college preparatory students had never taken a foreign language. In general, enrollment in foreign language courses declines in the higher grades. Again, this is particularly evident among the senior vocational students, 95.5 percent of whom did not take a foreign language in their senior year. By comparison, 89.5 percent of general education and 72.5 percent of college preparatory seniors did not take a foreign language in their last year of school.

Enrollment in science classes showed a steady decrease from Grade 9 to Grade 12, although the drop-off in enrollment occurred somewhat earlier for general education and vocational students than for college preparatory students. Among the seniors in our sample, 80.0 percent of college preparatory students had enrolled in a science class in their junior year, whereas only 34.2 percent of vocational and 26.3 percent of general education students took a science class that year. By the last year of school, only 11.0 percent of vocational students were enrolled in a science class, whereas 47.4 percent of general education and 45.0 percent of college preparatory students were enrolled. Among all the students interviewed, 29.1 percent indicated that they had never taken a business course while 70.9 percent indicated that they had. Approximately 77.0 percent of vocational students had taken at least one business course, compared to 67.9 percent of college preparatory and 50.0 percent of general education students. Enrollment in business classes was comparatively low in Grades 9 and 10 and higher in Grades 11 and 12. The percentage of vocational students enrolled in business courses was consistently higher than that for students in other programs across all four years. In Grades 11 and 12, approximately 60.0 percent of all vocational students were enrolled in a business course. By comparison, only 10.0 percent of general education students were enrolled in a business class in each of the last two years of high school.

The majority of students in the sample indicated that they had never taken a course in sales and marketing, trade and industry, or other technical courses. Although this held true for all school programs, a higher percentage of vocational students took at least one course in one of these areas than did students in the general education and college preparatory programs. With the exception of sales and marketing, enrollment in the classes remained consistently low across all grades for students in all school programs. Trade and industry courses appeared to be more popular among the general education students, approximately 10.0 percent of whom were enrolled in a class of that sort in any given year. By comparison, only 3.2 percent of senior vocational students and none of the senior college preparatory students were enrolled in a trade and industry course during their senior year.

Enrollment in sales and marketing classes remained very low through each of the first three years of school, with fewer than 10.0 percent of students in any of the three programs taking a course in that area in a given year. However, enrollment increased markedly for all programs in Grade 12, with 41.3 percent of vocational, 20.0 percent of college preparatory, and 15.8 percent of general education students taking a sales and marketing class.

Students were provided with a list of 19 jobs and were asked to indicate whether they had taken any courses that would help prepare them for an entry-level position in one of these areas. The results, summed across all programs and grade levels, are presented in table A-6. The highest percentage of students who had taken courses in preparation for certain job areas occurred in secretarial, typing, or other office work (66.7 percent of all students). Among the vocational students, 72.8 percent indicated having taken a course to prepare them for a job in this area, whereas the corresponding figures for college preparatory and general education students were 60.7 percent and 50.0 percent, respectively.

TABLE A-6

NUMBER OF STUDENTS WHO HAVE TAKEN COURSES TO PREPARE FOR A JOB IN A GIVEN AREA

Job	Course Taken N	Course Taken %
Agriculture, including horticulture	20	5.3
Auto mechanics	26	6.8
Commercial arts	53	13.9
Computer programming and computer operations	154	40.4
Carpentry trades	40	10.5
Electrical trades	30	7.9
Masonry trades	10	2.6
Plumbing trades	4	1.1
Cosmetology, hairdressing, or barbering	15	3.9
Drafting	77	20.2
Electronics	32	8.4
Home economics, dietetics, child care	145	38.1
Machine shop	43	11.3
Medical or dental assisting	15	3.9
Nursing or other health care	26	6.8
Food preparation	72	18.9
*Sales or merchandising	100	26.3
*Secretarial, typing, or other office work	254	66.7
Welding	17	4.5
Other	45	11.8

*Only courses that are co-op and that are offered in both comprehensive High School and career education centers. The other 17 courses are offered only through the career education centers.

Computer programming/operations, and home economics/ dietetics/child care also showed a high proportion of students who had some preparation for a job in those areas (40.4 percent and 38.1 percent, respectively). Among vocational students, 37.7 percent reported having taken a course to prepare them for an entry-level position in computer programming and operations, whereas the corresponding figures for college preparatory and general education students were 58.3 percent and 25.9 percent, respectively. In the home economics category, 45.2 percent of the vocational students reported having taken a course to prepare themselves for a job in that area. The corresponding figures for college preparatory and general education students were 26.2 percent and 25.9 percent, respectively.

Among the least frequently cited job areas for which students indicated they had taken some preparatory courses were plumbing trades (1.1 percent of all students), masonry trades (2.6 percent), cosmetology, hairdressing, or barbering (3.9 percent), and medical or dental assisting (3.9 percent). General education students indicated having taken courses to prepare for a job in each of these four areas in proportionally higher numbers than did vocational or college preparatory students. It is interesting to note the very low percentage of vocational students who prepared for an entry-level position in the masonry or plumbing trades (2.9 percent and 1.3 percent, respectively).

Students were given a list of 15 extracurricular and other non-school-related activities and were asked to indicate if they had not participated in a given activity, if they had participated actively (but not as a leader or officer), or if they had participated as a leader or officer. The results, summed across school programs and grades, are presented in table A-7.

Among the more popular activities were vocational education clubs, such as Future Homemakers of America (FHA), Future Teachers of America (FTA), Future Farmers of America (FFA), Distributive Education Clubs of America (DECA), Future Business Leaders of America (FBLA), and Vocational Industrial Clubs of America (VICA), in which 51.4 percent of the total sample of students reported participating either as a leader or member. Students also listed nonvarsity athletic teams and church activities as being among the more popular activities (43.8 percent and 41.8 percent, respectively). Among vocational students, 66.5 percent reported having participated in vocational education clubs, whereas 36.2 percent of general education and 19.0 percent of college preparatory students reported participating. A proportionally higher number of vocational students (21.3 percent) reported participating in vocational clubs as a leader or officer than did general education (17.2 percent) or college preparatory students (6.0 percent).

In terms of participation on nonvarsity athletic teams, 42.3 percent of vocational students reported participating at some level, whereas the corresponding figures for college preparatory and general education students were 44.9 percent and 44.8 percent, respectively. General education students participated in nonvarsity athletics in a leadership capacity at a proportionally higher rate (15.5 percent) than did college preparatory (10.7

TABLE A-7

NUMBER OF STUDENTS PARTICIPATING IN EXTRACURRICULAR ACTIVITIES

Activity	Have Not Participated		Have Participated Actively		Have Participated as Leader or Officer	
	N	%	N	%	N	%
Varsity athletic teams	259	68.0	76	20.0	46	12.0
Other athletic teams in or out of school	214	56.2	128	33.6	39	10.2
Cheer leaders, pep club, majorettes	312	81.9	55	14.4	14	3.7
Debating or drama	327	85.8	45	11.8	9	2.4
Band or orchestra	329	86.4	30	7.9	22	5.8
Chorus or dance	295	77.4	73	19.2	13	3.4
Hobby clubs such as photography, model building, hot rod, electronics, crafts	285	74.8	80	21.0	16	4.2
Honorary clubs, such as Beta Club or National Honor Society	316	82.9	54	14.2	11	2.9
School newspaper, magazine, yearbook, annual	340	89.2	32	8.4	9	2.4
School subject-matter clubs, such as science, history, language, business, art	253	66.4	116	30.5	12	3.2
Student council, student government, political club	325	85.3	41	10.8	15	3.9
Vocational education clubs, such as Future Homemakers, Teachers, Farmers of America, DECA, FBLA, or VICA	185	48.6	130	34.1	66	17.3
Youth organizations in the community such as Scouts, Y, etc.	277	72.7	70	18.4	34	8.9
Church activities, including youth groups	222	58.3	110	28.9	49	12.9
Junior Achievement	354	92.9	22	5.8	5	1.3

percent) or vocational students (8.8 percent). Finally, 39.7 percent of the vocational students reported participating in church activities, compared to 53.5 percent of the college preparatory and 32.8 percent of the general education students. In this category, a proportionally higher number of college preparatory students (15.5 percent) reported participating as a leader or officer in comparison to vocational (12.6 percent) and general education students (10.3 percent).

Students were asked to indicate the average amount of time they spent working on homework every week during the school year. Table A-8 presents the results partitioned according to each of the three school programs. Overall, 3.7 percent of the students reported that no homework was ever assigned them; 5.8 percent reported that although homework was assigned, they did not do it; 19.2 percent reported that they spent less than 1 hour a week on homework; 35.4 percent spent between 1 and 3 hours, 22.1 percent spent between 3 and 5 hours, 12.6 percent spent between 5 and 10 hours, and 1.3 percent reported spending more than 10 hours a week. As illustrated in table A-8, vocational students made up the majority of students who reported that no homework was ever assigned to them. On the other hand, 12.1 percent of the general education students reported that although they were assigned homework, they did not do any. The corresponding figures for vocational and college preparatory students were 5.9 percent and 1.2 percent, respectively. On the whole, college preparatory students reported spending more hours per week on homework than the other two groups. Among the college preparatory students, 50.1 percent reported spending more than 3 hours a week on homework, whereas 33.1 percent of the vocational and 27.6 percent of the general education students indicated spending that same amount of time.

Students were also asked to indicate how many hours per weekday they spent watching television. The results, partitioned by school program, are presented in table A-9. Averaging across all three school programs, the percentage of students reporting watching television and the time spent doing so are listed below:

- 5 percent--no time during the week
- 14.2 percent--less than 1 hour each weekday
- 21.0 percent--between 1 and 2 hours each weekday
- 24.2 percent--between 2 and 3 hours each weekday
- 13.4 percent--between 3 and 4 hours each weekday
- 8.7 percent--between 4 and 5 hours each weekday
- 13.7 percent--5 or more hours of television each weekday

General education students indicated that they spent more time watching television than college preparatory or vocational students. Among general education students, 25.8 percent reported watching 4 or more hours of television each weekday, compared to 23.8 percent of vocational and 15.5 percent of college preparatory students. On the other end of the scale, a proportionally higher number of vocational students (6.3 percent) indicated that they did not watch television at all during the week. The corresponding figures for college preparatory and general education students were 3.6 percent and 1.7 percent, respectively.

TABLE A-8

NUMBER OF STUDENTS BY TIME SPENT ON HOMEWORK AND SCHOOL PROGRAM

	School Program					
	General Education		College Preparatory		Vocational	
Amount of Time	N	%	N	%	N	%
No homework is ever assigned	1	1.7*	1	1.2	12	5.0
I have homework, but I don't do it	7	12.1	1	1.2	14	5.9
Less than 1 hour a week	12	20.7	13	15.5	48	20.1
Between 1 and 3 hours a week	22	37.9	27	32.1	86	36.0
Between 3 and 5 hours a week	14	24.1	26	31.0	44	18.4
Between 5 and 10 hours a week	2	3.5	14	16.7	32	13.4
More than 10 hours a week		0	2	2.4	3	1.3

*Percentages refer to total number of students within a given program.

TABLE A-9

NUMBER OF STUDENTS BY TIME SPENT WATCHING TV PER DAY AND SCHOOL PROGRAM

	School Program					
	General Education		College Preparatory		Vocational	
Amount of Time	N	%	N	%	N	%
Don't watch TV during week	1	1.7	3	3.6	15	6.3
Less than 1 hour per day	7	12.1	14	16.7	33	13.8
1 hour or more, less than 2	17	29.3	22	26.2	41	17.2
2 hours or more, less than 3	13	22.4	24	28.6	55	23.0
3 hours or more, less than 4	5	8.6	8	9.5	38	15.9
4 hours or more, less than 5	5	8.6	4	4.8	24	10.0
5 hours or more per day	10	17.2	9	10.7	33	13.8

Students were asked to indicate their own estimation of the probable future extent of their formal education. The results, partitioned by school program, are presented in table A-10. Averaging across all school programs, only one student (a college preparatory student) out of the sample of 381 reported that he did not expect to graduate from high school. Of those remaining, 12.9 percent expected to progress as far as graduation from high school; 16.5 percent expected to spend less than two years in a vocational, trade, or business school. Although the majority of the 137 students (36.0 percent of the total sample) who indicated that they expected to attend a vocational school after high school were students in the vocational program (73.7 percent), it is interesting to note that 8.8 percent were college preparatory and 17.5 percent were general education students.

The students who expected to attend an academically oriented college program are shown below by percentages according to their expectations:

- 4.2 percent--attend college less than two years
- 12.1 percent--attend college two or more years and attain a two-year degree
- 20.7 percent--finish college with a four- or five-year degree
- 6.8 percent--attain a Ph.D., M.D., or other advanced professional degree.

Table A-10 indicates that a rather high percentage of general education and vocational students indicated that they intended to pursue academically-oriented college degrees. In fact, 22.8

TABLE A-10

NUMBER OF STUDENTS BY EXPECTED EXTENT OF EDUCATION AND SCHOOL PROGRAM

	School Program					
	General Education		College Preparatory		Vocational	
Extent of Education	N	%	N	%	N	%
Less than high school graduation		0	1	1.2		0
High school graduation only	10	17.2	6	7.1	33	13.8
Vocational, trade, or business school after high school--less than two years	14	24.1	4	4.8	45	18.8
Vocational, trade, or business school after high school--two years or more	10	17.2	8	9.5	56	23.4
College program--less than two years	1	1.7	3	3.6	12	5.0
College program--two or more years including two-year degree)	4	6.9	6	7.1	36	15.1
College program four or five year degree)	13	22.4	33	39.3	33	13.8
College program Master's degree or equivalent)	2	3.5	9	10.7	15	6.3
College program Ph.D., M.D., or other advanced professional degree)	4	6.9	14	16.7	9	3.8

percent of general education and 13.8 percent of vocational students indicated that they intended to complete a four- or five-year college program.

From a list of possible activities students were asked to select the one that would most likely take the largest share of their time after leaving high school. The results, partitioned by school program, are presented by table A-11. Among those responding, 34.1 percent indicated that they would be working full-time after leaving school. The majority of these were vocational students (78.3 percent), although 14.0 percent were general education and 7.7 percent were college preparatory students. A comparatively small percentage of the sample (1.8 percent) indicated that they would be entering an apprenticeship or on-the-job training program, whereas 4.2 percent indicated that they would be going into regular military service or entering a military academy. Only one student expressed the intention to become a full-time homemaker (a college preparatory student).

Following are percentages of students according to their expressed intent to continue their education:

- o 14.2 percent--take vocational or technical courses at a trade or business school full-time or part-time
- o 2.9 percent--take academic courses at a junior or community college full-time or part-time
- o 4.5 percent--take vocational or technical courses at a junior or community college full-time or part-time
- o 32.6 percent--attend a 4-year college or university full-time or part-time

TABLE A-11

NUMBER OF STUDENTS BY IMMEDIATE PLANS AFTER LEAVING SCHOOL AND SCHOOL PROGRAM

	School Program					
	General Education		College Preparatory		Vocational	
Immediate Plans	N	%	N	%	N	%
Working full-time	18	31.0	10	11.9	101	42.3
Entering an apprenticeship or on-the-job training program	3	5.2	1	1.2	3	1.3
Going into regular military service or service academy)	3	5.2	3	3.6	10	4.2
Being a full-time homemaker	0		1	1.2		0
Taking vocational or technical courses at a trade or business school full-time or part-time	8	13.8	5	6.0	41	17.2
Taking academic courses at a junior or community college full-time or part-time	2	3.5	2	2.4	7	2.9
Taking technical or vocational subjects at a junior or community college full-time or part-time	2	3.5	2	2.4	13	5.4
Attending a 4-year college or university full-time or part-time	16	27.6	57	67.9	51	21.3
Working part-time, but not attending school or college	3	5.2	1	1.2	7	2.9
Other travel, take a break, no plans)	2	3.5	2	2.4	5	2.1

Among the remaining students, 2.9 percent indicated that they would be working part-time, but not attending school or college, whereas 2.4 percent reported that they were planning on doing something else (e.g., travelling or taking a break) or had no particular plans.

Finally, students were asked to rate two sets of 13 statements on a scale of 1 to 5 (where 1 = "strongly disagree", 2 = "moderately disagree", 3 = "undecided", 4 = "moderately agree", and 5 = "strongly agree") that were designed to allow them to describe their feelings about their job and school experiences. The two sets of statements used in each case were essentially identical to one another, although in several instances the wording varied slightly in order to bring the statement into correspondence with the particular setting under investigation (e.g., using "teacher" instead of "supervisor" for the school setting).

The results of the questionnaire for the job setting, averaged across school programs, are presented in table A-12, while those for the school setting are presented in table A-13. Results will be presented by comparing answers to the same statement for each of the two settings for the entire group of students, and for students partitioned by school program.

The first statement students were asked to respond to was "In my job (school program) I felt encouraged to find things out for myself." For the group as a whole, more students agreed (either moderately or strongly) with the statement as it related to the job site (71.1 percent) as compared to school (63.5 percent).

TABLE A-12

JOB DESCRIPTION STATEMENTS

Statement	Strongly Agree		Moderately Disagree		Undecided		Moderately Agree		Strongly Agree	
	N	%	N	%	N	%	N	%	N	%
1. In my job I felt encouraged to find things out for myself.	14	4.9*	29	10.1	40	13.9	127	44.3	77	26.8
2. I was able to tell by myself if I was doing a good job.	15	5.2	15	5.2	22	7.7	123	42.9	112	39.0
3. My supervisor taught me what I needed to know.	23	8.0	35	12.2	16	5.6	103	35.9	110	38.3
4. In my job I was able to ask many questions about the work.	23	8.0	12	4.2	12	4.2	80	27.9	160	55.8
5. The results of what I did had meaning; I felt the results were important.	16	5.6	28	9.8	47	16.4	92	32.1	104	36.2
6. My supervisor described the way he she) wanted to do my work.	19	6.6	22	7.7	22	7.7	110	38.3	114	39.7
7. In my job I had opportunities to try things out for myself.	24	8.4	43	15.0	36	12.5	107	37.3	77	26.8
8. The work I did offered me many different things to do.	20	7.0	37	12.9	27	9.4	118	41.1	85	29.6
9. My supervisor gave me the right way to do the work.	19	6.6	21	7.3	36	12.5	116	40.4	95	33.1
10. In my job, I was encouraged to come up with my own ideas.	39	13.6	62	21.6	83	28.9	59	20.6	44	15.3

*Percentages are derived from the number of students who held part-time jobs (N = 287).

TABLE A-12—Continued

Statement	Strongly Agree		Moderately Disagree		Undecided		Moderately Agree		Strongly Agree	
	N	%	N	%	N	%	N	%	N	%
11. My supervisor provides me with opportunities to do meaningful work or solve problems.	18	6.3	39	13.6	72	25.1	105	36.6	53	18.5
12. My supervisor showed me what was required of me.	19	6.6	24	8.4	15	5.2	115	40.1	114	39.7
13. My supervisor encouraged me to decide for myself how I was going to do my work.	38	13.2	48	16.7	51	17.8	94	32.8	56	19.5

TABLE A-13

SCHOOL DESCRIPTION STATEMENTS

Statement	Strongly Agree		Moderately Disagree		Undecided		Moderately Agree		Strongly Agree	
	N	%	N	%	N	%	N	%	N	%
1. In my school program I felt encouraged to find things out for myself.	23	6.0*	48	12.6	68	17.9	163	42.8	79	20.7
2. I was able to tell by myself if I was doing a good job.	19	5.0	40	10.5	48	12.6	170	44.6	104	27.3
3. My teachers taught me what I needed to know.	25	6.6	60	15.8	59	15.5	160	42.0	77	20.2
4. In my school program I was able to ask many questions about the work.	25	6.6	39	10.2	34	8.9	164	43.0	119	31.2
5. The results of what I did had meaning; I felt the results were important.	21	5.5	41	10.8	80	21.0	144	37.8	95	24.9
6. My teachers described the way they wanted me to do my work.	19	5.0	57	15.0	38	10.0	170	44.6	97	25.5
7. In my school program I was able to try things out for myself.	21	5.5	63	16.5	63	16.5	155	40.7	79	20.7
8. The work I did offered me many different things to do.	24	6.3	63	16.5	81	21.3	142	37.3	71	18.6

*Percentages are derived from total number of students interviewd (N = 381).

TABLE A-13--Continued

Statement	Strongly Agree		Moderately Disagree		Undecided		Moderately Agree		Strongly Agree	
	N	%	N	%	N	%	N	%	N	%
9. The teachers showed me the right way to do the work.	18	4.7	46	12.1	56	14.7	175	45.9	86	22.6
10. In my school program I was encouraged to come up with my own ideas.	17	4.5	63	16.5	89	23.4	146	38.3	66	17.3
11. The teachers provided me with opportunities to do meaningful work or solve problems.	21	5.5	52	13.7	62	16.3	173	45.4	73	19.2
12. The teachers showed me what was required of me.	19	5.0	39	10.2	33	8.7	179	47.0	111	29.1
13. The teachers encouraged me to decide for myself how I was going to do my work.	32	8.4	52	13.7	63	16.5	165	43.3	69	18.1

This held for all three school programs, but was most pronounced among general education students, 72.2 percent of whom agreed with the statement in regard to their job as compared to 51.7 percent in regard to school. The comparison for vocational students was 70.3 percent versus 64.0 percent, and for college preparatory students, 73.2 percent versus 70.2 percent. It is interesting to note the large differences among the programs in regard to the school environment on this statement. College preparatory students perceived school as offering far greater opportunities for independent learning than did general education students. Vocational students were intermediate between these two groups, but were closer to the perceptions of college preparatory students.

When asked to rate the statement "I was able to tell by myself if I was doing a good job," 81.9 percent of the total sample agreed in relation to the job environment as compared to 71.9 percent for the school environment. This trend held up for each of the three school programs. The disparity, however, between the two settings was greatest for the college preparatory students, 89.3 percent of whom agreed with the statement in relation to their job setting versus 77.4 percent for the school setting. The comparison between the job setting and school for the general education and vocational students were 77.8 percent versus 70.7 percent, and 80.5 percent versus 70.3 percent, respectively. College preparatory students again rated their school setting higher than the other two programs on a measure of independence, i.e., being able to readily evaluate the quality of their own work.

The statement "My supervisor (teacher) taught me what I needed to know" also produced a higher rate of agreement in relation to the job rather than to school setting. Across all programs, 74.2 percent agreed that the statement applied to their job setting, whereas 62.2 percent agreed that it applied to school. Once again, this held up across all three of the school programs. General education students produced the largest discrepancy, with 80.6 percent agreeing with the statement in relation to their job, but only 50.0 percent agreeing with it in relation to school. The discrepancies for vocational and college preparatory students were 74.4 percent versus 65.7 percent, and 69.6 percent versus 60.7 percent, respectively. Vocational students evidently felt that instruction in their particular school environment--though less functional than that received in the workplace--was more so than that which college preparatory and general education students perceived.

When asked to respond to the statement "In my job (school program) I was able to ask many questions about the work," a proportionally higher number of students agreed that the statement applied to their work rather than to school setting. Across all programs, 83.7 percent of the students agreed that the statement applied to their work setting, whereas 74.2 percent agreed that it applied to school. This held for all three school programs with the largest discrepancy occurring for the general education students, 86.1 percent of whom agreed that the statement applied to the work setting as opposed to 62.1 percent for school. The comparable figures for college preparatory and vocational students were 85.7 percent versus 70.2 percent, and 82.6 percent versus 78.7 percent, respectively. The results of students' ratings on this statement indicate that vocational students felt that their particular school environment afforded a greater opportunity for questioning their teachers than did students in the other programs. Students in all programs, however, agreed that the job setting was more conducive than was school to asking questions about the work to be done.

The statement "The results of what I did had meaning, I felt the results were important" produced for the total sample of students a higher rate of agreement in relation to the job rather than the school setting. Among those responding, 68.3 percent agreed that the statement applied to their job, whereas 62.7 percent agreed that it applied to school. This held for all three programs with the largest discrepancy existing for the general education students. Of this group 66.7 percent agreed that the statement applied to their job setting as opposed to 56.9 percent who felt it applied to school. The corresponding figures for the college preparatory and vocational students were 71.4 percent versus 67.9 percent, and 67.7 percent versus 62.3 percent, respectively. College preparatory students, followed by vocational students, evidently felt that in both the job and school setting they were performing work that was more meaningful and important. General education students viewed the work, both at the job and at school, as having less importance than either of the other two groups of students did.

When asked to rate the statement "My supervisor (the teachers) described the way he (they) wanted me to do my work," 78.0 percent of the total sample agreed that it applied to the job setting, whereas 70.1 percent agreed that it applied to school. Once again, the relationship held up across all three school programs with the largest discrepancy existing for general education students. Of this group, 86.1 percent agreed that the statement applied to their job, whereas only 63.8 percent agreed that it applied to school. The comparable figures for college preparatory and vocational students were 87.5 percent versus 69.1 percent, and 73.9 percent versus 72.0 percent, respectively. It is interesting to note that the discrepancy in ratings for the two settings was smallest for the vocational students who, more than the other two programs, agreed that teachers in school described the way in which work was to be done.

Students were asked to rate the statement "In my job (school program) I had opportunities to try things out for myself." Among those responding, 64.1 percent agreed that the statement applied to the job setting, whereas 61.4 percent agreed that it applied to school. However, this trend held for general education and vocational students only. Among general education students, 66.7 percent agreed that the statement applied to their work, but only 41.4 percent agreed that it applied to school. Comparable figures for vocational students were 66.2 percent versus 65.7 percent. Among college preparatory students, however, 63.1 percent agreed that they had opportunities to try things out for themselves at school, whereas 55.4 percent agreed with the statement in relation to work. It is interesting to note that, although vocational students felt that they had more opportunities for exploratory learning at work than at school, they still perceived a greater opportunity for this sort of learning at school than did students in the other programs.

The statement "The work I did offered me many different things to do" produced a higher rate of agreement in relation to the job as compared to the school setting. Among those responding, 70.7 percent agreed that the statement applied to their job setting, whereas 55.9 percent agreed that it applied to school. This held up across all school programs, with the greatest discrepancy occurring for the general education students. Among this group, 77.8 percent agreed that the statement applied to work, whereas only 44.8 percent agreed that it applied to school. Comparable figures for college preparatory and vocational students were 71.4 percent versus 51.2 percent and 69.2 percent versus 60.3 percent, respectively. Vocational students perceived their particular school setting as offering a greater variety of different things to do than students in the other programs did. Students as a whole, however, felt there was a greater variety of things to do at work than at school.

Students were asked to rate the statement "My supervisor (teacher) showed me the right way to do the work." Among those responding, 73.5 percent agreed that the statement applied to the work setting, whereas 68.5 percent agreed that it applied to school. Once again, this held for general education and vocational students, but not for college preparatory students.

Among general education students, 80.6 percent agreed that the statement applied to their job, whereas only 58.6 percent agreed that it applied to school. The corresponding figures for vocational students were 73.3 percent versus 69.0 percent. Among college preparatory students, however, 73.8 percent agreed that the statement applied to school, whereas 69.6 percent agreed that it applied to their job.

When students were asked to respond to the statement "In my job (school program) I was encouraged to come up with my own ideas," a higher rate of agreement was observed regarding the school as compared to the job setting. Across all programs, 55.6 percent of the students agreed that the statement applied to school, but only 35.8 percent agreed that it applied to work. This trend held for all three school programs, with the largest difference occurring for college preparatory students, 57.1 percent of whom agreed that the statement applied to school, whereas 35.7 percent agreed that it applied to work. The corresponding figures for vocational and general education students were 56.9 percent versus 35.9 percent and 50.0 percent versus 36.1 percent, respectively. It is evident that, even though ratings on an earlier statement indicated that students felt encouraged to find things out for themselves at work, they evidently felt that they were not encouraged to explore their own ideas there. The school environment was evidently perceived as being somewhat more conducive to this type of learning activity, particularly for college preparatory and vocational students.

The statement "My supervisor (teacher) provided me with opportunities to do meaningful work or solve problems" resulted in a higher rate of agreement regarding the school rather than the job setting. Among those students responding, 64.6 percent agreed that the statement applied to school, whereas 55.1 percent agreed that it applied to their job. This held for all school programs, with the largest difference occurring for general education students, 60.3 percent of whom agreed that the statement applied to school as compared to 44.4 percent regarding the job setting. Corresponding figures for vocational and college preparatory were 67.8 percent versus 59.0 percent and 58.3 percent versus 48.2 percent, respectively. It is interesting to note that vocational students showed a higher rate of agreement than students of other programs where having the opportunity to do meaningful work in the school setting is concerned.

When asked to respond to the statement "My supervisor (teacher) showed me what was required of me," a higher rate of agreement was observed regarding the job than the school setting. Across all programs, 79.8 percent of the students agreed that the statement applied to their job, whereas 76.1 percent agreed that it applied to school. This held for the vocational and general education students, but not for college preparatory students. Among general education students, 86.1 percent agreed that the statement applied to their job as compared to 70.7 percent who agreed that it applied to school. The corresponding figures for the vocational program was 80.0 percent versus 76.6 percent. Among college preparatory students, 78.6 percent agreed that the statement applied to school, whereas 75.0 percent agreed that it applied to work.

Finally, when students were asked to rate the statement "My supervisor (teacher) encouraged me to decide for myself how I was going to do my work," a higher rate of agreement was observed regarding the school than the job setting. Among those responding, 61.4 percent agreed that the statement applied to school, whereas 52.3 percent agreed that it applied to work. This trend held for the college preparatory and vocational students, but not for the general education students. Among college preparatory students, 60.9 percent agreed that the statement applied to school, whereas 42.9 percent agreed that it applied to work. The corresponding figures for vocational students were 64.9 percent versus 52.9 percent. Among general education students, 58.3 percent agreed that the statement applied to their job, whereas 46.6 percent agreed that it applied to school. These results indicate that vocational students perceived themselves as being able to employ more of their own discretion in doing their work at school than did students in other programs.

OMB No. 1830-0502
Expiration Date 10/31/85

BASIC SKILLS IN SCHOOL AND WORK ENVIRONMENTS

STUDENT INTERVIEW

General Directions

This interview is part of a study of student acquisition and retention of basic skills in school and work settings. The questions are concerned with your basic skills development.

Your participation in this study is completely voluntary. Your responses will be kept confidential and will only be seen by the research staff. Results of the study will be made public only in summary or statistical form so that individuals who participate cannot be identified.

The National Center for Research in Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210-1090

RESPONDENT IDENTIFICATION

Student Name: ______________________________

Student ID: ______________________________

INTERVIEW INFORMATION

Interview Date: ______________________________

Interview Time: ______________________________

School Building: ______________________________

Interview Room/Area: ______________________________

Interviewer Name: ______________________________

Interviewer ID: ______________________________

BEGIN INTERVIEW BY READING THE DIRECTIONS ON THE FRONT COVER AND ANSWERING STUDENT'S QUESTIONS

FIRST QUESTION

Have you had a part-time job at any time during the school year (September 1984 to present)?

☐ YES — Go to PART A (1)

☐ NO — Go to PART B (0)

NOTE: All co-op students should answer YES to this question.

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[If column 10 is 0, put "B" in columns 11 through 31]

PART A — JOB DESCRIPTION AND WORK DESCRIPTION

1. Are you currently employed? — 11

☐ YES (1)   ☐ NO (0)

2. Is (was) your job part of your formal school program? (e.g., co-op job or receive academic credit for work experience) — 12

☐ YES (1)   ☐ NO (0)

3. How much do (did) you earn per hour on your job? — 13 — 14 — 15

$__ __ . __ __(wage rate: 03.35, 04.52)

☐ Have not worked for pay (AAAA)

4. What is (was) the name of your employer? ____________________

5. What kind of employer do (did) you work for? **(CHECK ONLY ONE)** — 16

☐ Government (city, county, state) (1)
☐ Private company or business (2)
☐ Nonprofit organization (like church or charity) (3)
☐ Neighbor or friend (4)

6. Your job title: ____________________

7. What are (were) the five main duties of your job? (Provide as much detail as possible. Begin each duty with a verb. Examples: stock shelves, type letters, operate forklift, run errands.)

Duties 1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________

8. How long have (did) you had (have) this job? **(CHECK ONE)** — 17

☐ less than 1 month (1)
☐ 1 to 1.9 months (2)
☐ 2 to 3.9 months (3)
☐ 4 to 5.9 months (4)
☐ 6 to 8.9 months (5)
☐ 9 to 11.9 months (6)
☐ 12 or more months (7)
☐ Do not know (9)

9. How many hours do (did) you work a **week** on the job? **(CHECK ONE)** — 18

☐ 1 to 4.9 hours (1)
☐ 5 to 9.9 hours (2)
☐ 10 to 14.9 hours (3)
☐ 15 to 19.9 hours (4)
☐ 20 to 24.9 hours (5)
☐ 25 to 29.9 hours (6)
☐ 30 to 34.9 hours (7)
☐ 35 hours or more (8)

10. The following items describe different ways in which you could describe your job. For each item, check the box that represents your opinion. Use the following scale **(CHECK ONE BOX FOR EACH LINE)**:

Your Opinion
Strongly agree
Moderately agree
Undecided
Moderately disagree
Strongly disagree

Items Describing Job	SD (1)	MD (2)	U (3)	MA (4)	SA (5)	
1. In my job I felt encouraged to find things out for myself.	☐	☐	☐	☐	☐	___ 19
2. I was able to tell by myself if I was doing a good job.	☐	☐	☐	☐	☐	___ 20
3. My supervisor taught me what I needed to know.	☐	☐	☐	☐	☐	___ 21
4. In my job I was able to ask many questions about the work.	☐	☐	☐	☐	☐	___ 22
5. The results of what I did had meaning; I felt the results were important.	☐	☐	☐	☐	☐	___ 23
6. My supervisor described the way he (she) wanted me to do my work.	☐	☐	☐	☐	☐	___ 24
7. In my job I had opportunities to try things out for myself.	☐	☐	☐	☐	☐	___ 25
8. The work I did offered me many different things to do.	☐	☐	☐	☐	☐	___ 26
9. My supervisor gave me the right way to do the work.	☐	☐	☐	☐	☐	___ 27
10. In my job, I was encouraged to come up with my own ideas.	☐	☐	☐	☐	☐	___ 28
11. My supervisor provides me with opportunities to do meaningful work or solve problems.	☐	☐	☐	☐	☐	___ 29
12. My supervisor showed me what was required of me.	☐	☐	☐	☐	☐	___ 30
13. My supervisor encouraged me to decide for myself how I was going to do my work.	☐	☐	☐	☐	☐	___ 31

14

PART B — EDUCATIONAL EXPERIENCES

1. Which of the following best describes your grades so far in high school? **(CHECK ONE)**

☐ Mostly A's	(90 to 100% or about 3.8) (1)
☐ Almost half A's and half B's	(85 to 89% or about 3.5) (2)
☐ Mostly B's	(80 to 84% or about 3.0) (3)
☐ Almost half B's and half C's	(75 to 79% or about 2.5) (4)
☐ Mostly C's	(70 to 74% or about 2.0) (5)
☐ Almost half C's and half D's	(65 to 69% or about 1.5) (6)
☐ Mostly D's or lower	(Lower than 65% or about 1.3) (7)

__ 32

2. Which of the following best describes your present high school program? **(CHECK ONE)**

- ☐ General (10)
- ☐ Academic or college preparatory (20)
- Vocational (occupational preparation)
  - ☐ Agricultural occupations (31)
  - ☐ Business or office occupations (32)
  - ☐ Distributive education (33)
  - ☐ Health occupations (34)
  - ☐ Home economics occupations (35)
  - ☐ Technical occupations (36)
  - ☐ Trade or industrial occupations (37)

__ 33 __ 34

3. Starting with the beginning of ninth grade, indicate the grade levels in which you took a course in the following subjects. Be sure to count this school year. **(MARK THE GRADE LEVELS IN WHICH YOU TOOK THE FOLLOWING SUBJECTS.)**

Check = 1
No check = 0

Subjects	**Not Taken**	**Grade 9**	**Grade 10**	**Grade 11**	**Grade 12**
Mathematics	☐	☐	☐	☐	☐
English or Literature	☐	☐	☐	☐	☐
History/Social Studies	☐	☐	☐	☐	☐
Foreign Languages	☐	☐	☐	☐	☐
Science	☐	☐	☐	☐	☐
Business/Office	☐	☐	☐	☐	☐
Sales/Marketing	☐	☐	☐	☐	☐

__ 35 __ 36 __ 37 __ 38 __ 39
__ 40 __ 41 __ 42 __ 43 __ 44
__ 45 __ 46 __ 47 __ 48 __ 49
__ 50 __ 51 __ 52 __ 53 __ 54
__ 55 __ 56 __ 57 __ 58 __ 59
__ 60 __ 61 __ 62 __ 63 __ 64
__ 65 __ 66 __ 67 __ 68 __ 69

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Trade and Industry	☐	☐	☐	☐	☐
Technical Courses	☐	☐	☐	☐	☐
Other Vocational	☐	☐	☐	☐	☐
Other Electives	☐	☐	☐	☐	☐

__ 9 __ 10 __ 11 __ 12 __ 13
__ 14 __ 15 __ 16 __ 17 __ 18
__ 19 __ 20 __ 21 __ 22 __ 23
__ 24 __ 25 __ 26 __ 27 __ 28

4. Have you taken any high school courses that have prepared you for a beginning job related to those courses? **(MARK "YES" or "NO" FOR EACH COURSE)**

Yes = 1
No = 0

YES	NO		
☐	☐	Agriculture, including horticulture	29
☐	☐	Auto mechanics	30
☐	☐	Commercial arts	31
☐	☐	Computer programming and computer operations	32
☐	☐	Carpentry trades	33
☐	☐	Electrical trades	34
☐	☐	Masonry trades	35
☐	☐	Plumbing trades	36
☐	☐	Cosmetology, hairdressing, or barbering	37
☐	☐	Drafting	38
☐	☐	Electronics	39
☐	☐	Home economics, dietetics, child care	40
☐	☐	Machine shop	41
☐	☐	Medical or dental assisting	42
☐	☐	Nursing or other health care	43
☐	☐	Food preparation	44
☐	☐	Sales or merchandising	45
☐	☐	Secretarial, typing, or other office work	46
☐	☐	Welding	47
☐	☐	Other (specify) ______________________	48

5. The following items describe different ways in which you could describe your school program. For each item, check the box that represents your opinion. Use the following scale:

Your Opinion
Strongly agree
Moderately agree
Undecided
Moderately disagree
Strongly disagree

Items Describing Job	SD (1)	MD (2)	U (3)	MA (4)	SA (5)	
1. In my school program I felt encouraged to find things out for myself.	☐	☐	☐	☐	☐	__ 49
2. I was able to tell by myself if I was doing a good job.	☐	☐	☐	☐	☐	__ 50
3. My teachers taught me what I needed to know.	☐	☐	☐	☐	☐	__ 51
4. In my school program I was able to ask many questions about the work.	☐	☐	☐	☐	☐	__ 52
5. The results of what I did had meaning; I felt the results were important.	☐	☐	☐	☐	☐	__ 53
6. The teachers described the way they wanted me to do my work.	☐	☐	☐	☐	☐	__ 54
7. In my school program I had opportunities to try things out for myself.	☐	☐	☐	☐	☐	__ 55
8. The work I did offered me many different things to do.	☐	☐	☐	☐	☐	__ 56
9. The teachers showed me the right way to do the work.	☐	☐	☐	☐	☐	__ 57
10. In my school program I was encouraged to come up with my own ideas.	☐	☐	☐	☐	☐	__ 58
11. The teachers provided me with opportunities to do meaningful work or solve problems.	☐	☐	☐	☐	☐	__ 59
12. The teachers showed me what was required of me.	☐	☐	☐	☐	☐	__ 60
13. The teachers encouraged me to decide for myself how I was going to do my work.	☐	☐	☐	☐	☐	__ 61 S 62

6. Have you participated in any of the following types of activities either in or out of school this year? **(CHECK ONE BOX FOR EACH LINE)**

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	(0) Have not participated	**(1) Have participated actively (but not as a leader or officer)**	**(2) Have participated as a leader or officer**	
a. Varsity athletic teams	☐	☐	☐	8
b. Other athletic teams — in or out of school	☐	☐	☐	9
c. Cheer leaders, pep club, majorettes	☐	☐	☐	10
d. Debating or drama	☐	☐	☐	11
e. Band or orchestra	☐	☐	☐	12
f. Chorus or dance	☐	☐	☐	13
g. Hobby clubs such as photography, model building, hot rod, electronics, crafts	☐	☐	☐	14
h. Honorary clubs, such as Beta Club or National Honor Society	☐	☐	☐	15
i. School newspaper, magazine, yearbook, annual	☐	☐	☐	16
j. School subject-matter clubs, such as science, history, language, business, art	☐	☐	☐	17
k. Student council, student government, political club	☐	☐	☐	18
l. Vocational education clubs, such as Future Homemakers, Teachers, Farmers of America, DECA, FBLA, or VICA	☐	☐	☐	19
m. Youth organizations in the community such as Scouts, Y, etc.	☐	☐	☐	20
n. Church activities, including youth groups	☐	☐	☐	21
o. Junior Achievement	☐	☐	☐	22

7. Approximately what is the average amount of time you spend on homework a **week**? **(CHECK ONE)** — 23

- ☐ No homework is ever assigned (0)
- ☐ I have homework, but I don't do it (1)
- ☐ Less than 1 hour a week (2)
- ☐ Between 1 and 3 hours a week (3)
- ☐ More than 3 hours, less than 5 hours a week (4)
- ☐ Between 5 and 10 hours a week (5)
- ☐ More than 10 hours a week (6)

8. During week days about how many **hours per day** do you watch TV? **(CHECK ONE)** — 24

- ☐ Don't watch TV during week (0)
- ☐ Less than 1 hour (1)
- ☐ 1 hour or more, less than 2 (2)
- ☐ 2 hours or more, less than 3 (3)
- ☐ 3 hours or more, less than 4 (4)
- ☐ 4 hours or more, less than 5 (5)
- ☐ 5 or more (6)

9. As things stand now, how far in school do you think you will get? **(CHECK ONE)** — 25

- ☐ Less than high school graduation (0)
- ☐ High school graduation only (1)
- ☐ Vocational, trade, or business school after high school—less than two years (2)
- ☐ Vocational, trade, or business school after high school—two years or more (3)
- ☐ College program—less than two years of college (4)
- ☐ College program—two or more years of college (5) (including two-year degree) (6)
- ☐ College program—finish college (four or five-year degree) (7)
- ☐ College program—Master's degree or equivalent (8)
- ☐ College program—Ph.D., M.D., or other advanced professional degree (9)

10. What is the one thing that most likely will take the largest share of your time in the year after you leave high school? **(CHECK ONE)** — 26

- ☐ Working full-time (1)
- ☐ Entering an apprenticeship or on-the-job training program (2)
- ☐ Going into regular military service (or service academy) (3)
- ☐ Being a full-time homemaker (4)
- ☐ Taking vocational or technical courses at a trade or business school full-time or part-time (5)
- ☐ Taking academic courses at a junior or community college full-time or part-time (6)
- ☐ Taking **technical or vocational** subjects at a junior or community college full-time or part-time (7)
- ☐ Attending a four-year college or university full-time or part-time (8)
- ☐ Working part-time, but not attending school or college (9)
- ☐ Other (travel, take a break, no plans) (0)

11. What other things do you now plan to do the year after you leave high school? **(CHECK ALL THAT APPLY)**

Check = 1
No check = 0

☐ Work — 27

☐ Enter an apprenticeship or on-the-job training program — 28

☐ Go into regular military service (or service academy) — 29

☐ Be a homemaker — 30

☐ Take vocational or technical courses at a trade or business school — 31

☐ Take academic courses at a junior or community college — 32

☐ Take technical or vocational subjects at a junior or community college — 33

☐ Attend a four-year college or university — 34

☐ Other (travel, take a break, no plans) — 35 S — 36

PART C — STUDENT ADDRESS

☐ If you are a junior, thank you for participating in this interview.

☐ If you are a GRADUATING SENIOR, we would like to contact you next September to obtain additional information.

Please provide us with the name, address, and phone number of someone (parent, friend) who could tell us where we could contact you or who could forward mail to you.

YOUR NAME: First ______ Last ______

PARENT/FRIEND: First ______ Last ______

STREET ADDRESS ______

CITY ______ STATE ______ ZIP CODE ______

PHONE NUMBER ______

THANK YOU FOR PARTICIPATING

APPENDIX B

RESULTS FROM CLASSROOM AND WORK ENVIRONMENT SCALES

Students' Perceptions of Classroom Environments

A total of 325 students from 168 classrooms completed the Classroom Environment Scale (CES). The CES has 9 subscales composed of 90 items that students score as true or false. The descriptions of the 9 subscales are presented in table B-1. From the college preparatory program, 83 students rated 52 classrooms. From the general education program, 105 students rated 92 classrooms. From the vocational education, noncooperative program, 89 students rated 15 classrooms. From the vocational education, cooperative program, 48 students rated 9 classrooms. The means and standard deviations for the nine CES subscales are given in table B-2. Both the published normative data and the data obtained from this study are presented for comparison.

Within the 168 different classrooms, the number of students who rated different kinds of classes are as follows:

- Math - 29
- English - 58
- Science - 11
- Social studies or history - 94
- Clerical/COE/banking classes - 27
- Distribution education/marketing education/department store - 40
- Automation technology - 13
- Other types - 59

TABLE B-1
CLASSROOM ENVIRONMENT SCALE SUBSCALE DESCRIPTIONS

1. Involvement - measures the extent to which students have attentive interest in class activities and participate in discussions. The extent to which students do additional work on their own and enjoy the class is considered.

2. Affiliation - assesses the level of friendship students feel for each other, i.e., the extent to which they help each other with homework, get to know each other easily, and enjoy working together.

3. Teacher Support - measures the amount of help, concern, and friendship the teacher directs toward the students. The extent to which the teacher talks openly with students, trusts them, and is interested in their ideas is considered.

4. Task Orientation - measures the extent to which it is important to complete the activities that have been planned. The emphasis the teacher places on staying on the subject matter is assessed.

5. Competition - assesses the emphasis placed on students' competing with each other for grades and recognition. An assessment of the difficulty of achieving good grades is included.

6. Order and Organization - assesses the emphasis on students' behaving in an orderly and polite manner and on the overall organization of assignments and classroom activities. The degree to which students tend to remain calm and quiet is considered.

7. Rule Clarity - assesses the emphasis on establishing and following a clear set of rules, and on students' knowing what the consequences will be if they do not follow them. An important focus of this subscale is the extent to which the teacher is consistent in dealing with students who break rules.

8. Teacher Control - measures how strict the teacher is in enforcing the rules and the severity of the punishment for rule infractions. The number of rules and the ease of students' getting into trouble is considered.

9. Innovation - measures how much students contribute to planning classroom activities, and the amount of unusual and varying activities and assignments planned by the teacher. The extent to which the teacher attempts to use new techniques and encourages creative thinking in the students is considered.

SOURCE: Moos and Trickett (1974).

TABLE B-2

COMPARISON OF STUDENT CES MEANS TO NORM CES MEANS

Subscale	Norm Students N = 465		College Preparatory Students N = 83		Gen. Ed. Students N = 105		Nonco-op Students N = 89		Co-op Students N = 48	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Involvement	5.17	1.88	5.55	2.46	5.25	2.45	5.42	2.77	4.60	2.55
Affiliation	6.51	1.22	6.90	2.42	6.50	2.35	6.55	2.32	5.69	2.38
Teacher support	6.74	1.65	6.49	2.55	6.32	2.11	6.57	2.18	5.33	2.46
Task orientation	6.32	1.61	6.51	2.68	6.43	2.32	6.85	2.31	5.94	2.54
Competition	5.24	1.25	5.70	2.08	5.39	1.94	5.48	1.71	5.17	1.84
Order/organization	5.88	1.89	6.42	2.78	5.95	2.45	5.83	2.63	5.19	2.53
Rule clarity	5.92	1.41	6.64	2.16	6.67	2.31	7.02	2.09	6.15	2.33
Teacher control	3.76	1.65	4.57	2.44	5.23	2.41	5.47	2.18	5.23	2.37
Innovation	5.00	1.73	4.99	2.37	4.49	1.92	4.80	2.05	4.44	1.76

Scores for each CES subscale were computed for every student. The data were then analyzed employing one-way analyses of variance (ANOVA) for race, sex, and school program effects.

No significant racial differences were found for any of the nine CES subscales. As illustrated in figure B-1, whites (N = 166) and blacks (N = 159) are essentially identical on all 9 subscales. The highest score for both races was obtained on the subscale measuring rule clarity and the lowest score for both was obtained on the innovation subscale. These results indicate that race is not a salient variable in terms of explaining students' perceptions of the school environment.

In addition, no significant gender differences were found for any of the nine CES subscales. As figure B-2 illustrates, males (N = 96) and females (N = 229) have scores essentially identical to one another on each subscale. The highest score for both sexes was obtained on the clarity subscale, while the lowest score for both was obtained on the subscale measuring innovation. These results indicate that gender, in much the same fashion as race, is not an effective discriminator between students in terms of perceiving the school environment.

The generally high ratings on the rule clarity subscale indicate that students perceived a high degree of consistency in the manner with which their teachers dealt with students who broke rules; consequently, students were aware of the rules and the consequences for breaking those rules within the classroom. On the other hand, the low ratings observed on the innovation subscale indicate that students neither viewed themselves as contributing to the planning of classroom activities nor perceived the

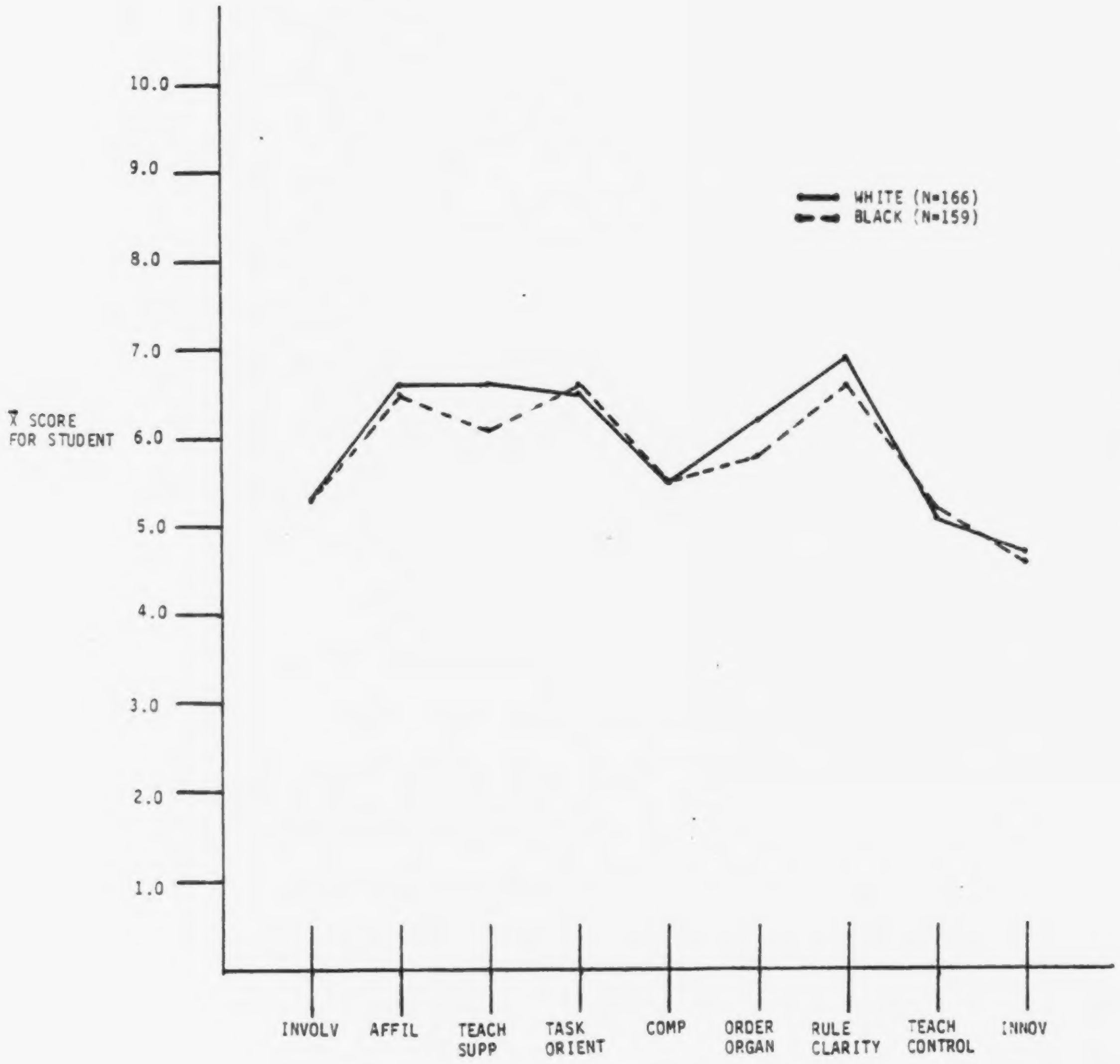

Figure B-1. Mean scores of whites and blacks for the CES subscales

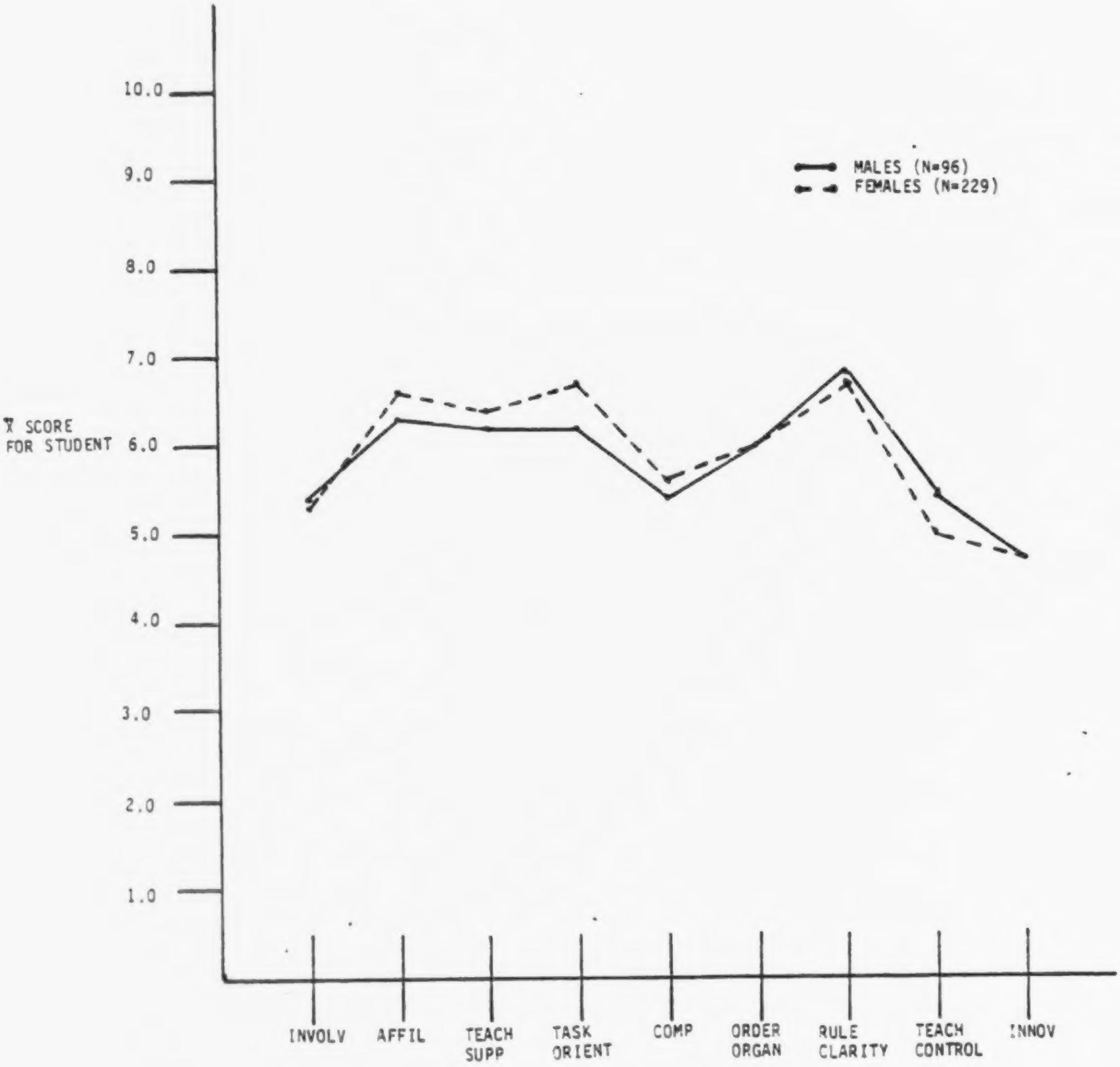

Figure B-2. Mean scores of males and females for the CES subscales activities or assignments as unusual or varying. The mean for rule clarity is higher than the published normative mean for this subscale, and the mean for innovation is higher than its published normative mean. The means and standard deviations of the nine subscales in the present study, however, do not differ grossly from the normative means and standard deviations (see table B-2).

The analysis for the effect of school program revealed significant differences on 4 of the 9 subscales--affiliation, $F(3,321) = 2.70$, $p < .05$; teacher support, $F(3,321) = 3.44$, $p < .02$; order and organization, $F(3,321) = 2.34$, $p < .08$; and teacher control, $F(3,321) = 2.31$, $p < .08$. Tukey contrasts revealed significant differences ($p < .05$) between the college preparatory and vocational co-op programs for affiliation; between the college preparatory and vocational co-op programs, and the vocational nonco-op and vocational co-op programs for teacher support; and between the college preparatory and vocational co-op programs for order and organization. Table B-3 provides a summary of the statistical analyses.

The results indicate that students in the college preparatory program perceived higher levels of friendship among themselves, perceived a greater willingness to help each other with homework, and expressed greater enjoyment in working with one another than the vocational co-op students. College preparatory students also perceived a higher level of politeness and orderliness in the classroom than did vocational co-op students. Both college preparatory and vocational nonco-op students perceived higher

TABLE B-3

EFFECTS OF PROGRAM ON STUDENTS' CLASSROOM PERCEPTIONS

	Analysis of Variance	Tukey Tests (Contrasts)					
CES Subscale	School Programs (P_1, P_2, P_3, P_4)	P_1 vs. P_2	P_1 vs. P_3	P_1 vs. P_4	P_2 vs. P_3	P_2 vs. P_3	P_3 vs. P_4
Involvement							
Affiliation	X_1			X_1			
Teacher support	X_1			X_1			X_1
Task orientation	X_1						
Competition							
Order & organization	X_2			X_1			
Rule clarity							
Teacher control	X_1						
Innovation							

KEY:

$X_1 \leq .05$
$X_2 \leq .10$

P_1: 83 students, 52 classrooms - College preparatory
P_2: 105 students, 92 classrooms - General education
P_3: 89 students, 15 classrooms - Vocational education, nonco-op
P_4: 48 students, 9 classrooms - Vocational education, co-op

TOTALS: 325 students, 168 classrooms

levels of help, concern, and friendship on the part of teachers toward students than did vocational co-op students. Figure B-3 illustrates the student program means across the nine subscales.

From figure B-3 it can also be seen that vocational co-op students rated their classroom environments lower than other students did on nearly every subscale. Individual classrooms were investigated to determine whether one class type was responsible for lowering scores for the vocational co-op students. The classes investigated include COE, marketing education, banking, and department store marketing. The department store marketing class, a vocational co-op class, was seen as the most disorganized and disrupted. It is conceivable that this particular class may have been responsible for the low vocational co-op scores.

An analysis of subject matter revealed significant differences on 4 of the 9 subscales--involvement, $F(3,190) = 2.84$, $p < .04$; teacher support, $F(3,190) = 2.41$, $p < .07$; task orientation, $F(3,190) = 3.83$, $p <. 02$; and teacher control, $F(3,190) = 3.63$, $p < .02$ (see table B-4). Tukey contrasts revealed significant differences ($p < .05$) between classes for several factors:

involvement - between the COE class and the department store marketing class
- between the banking class and the department store marketing class

teacher support - between the banking class and the department store marketing class

task orientation - between the banking class and the marketing education class
- between the COE class and the marketing education class

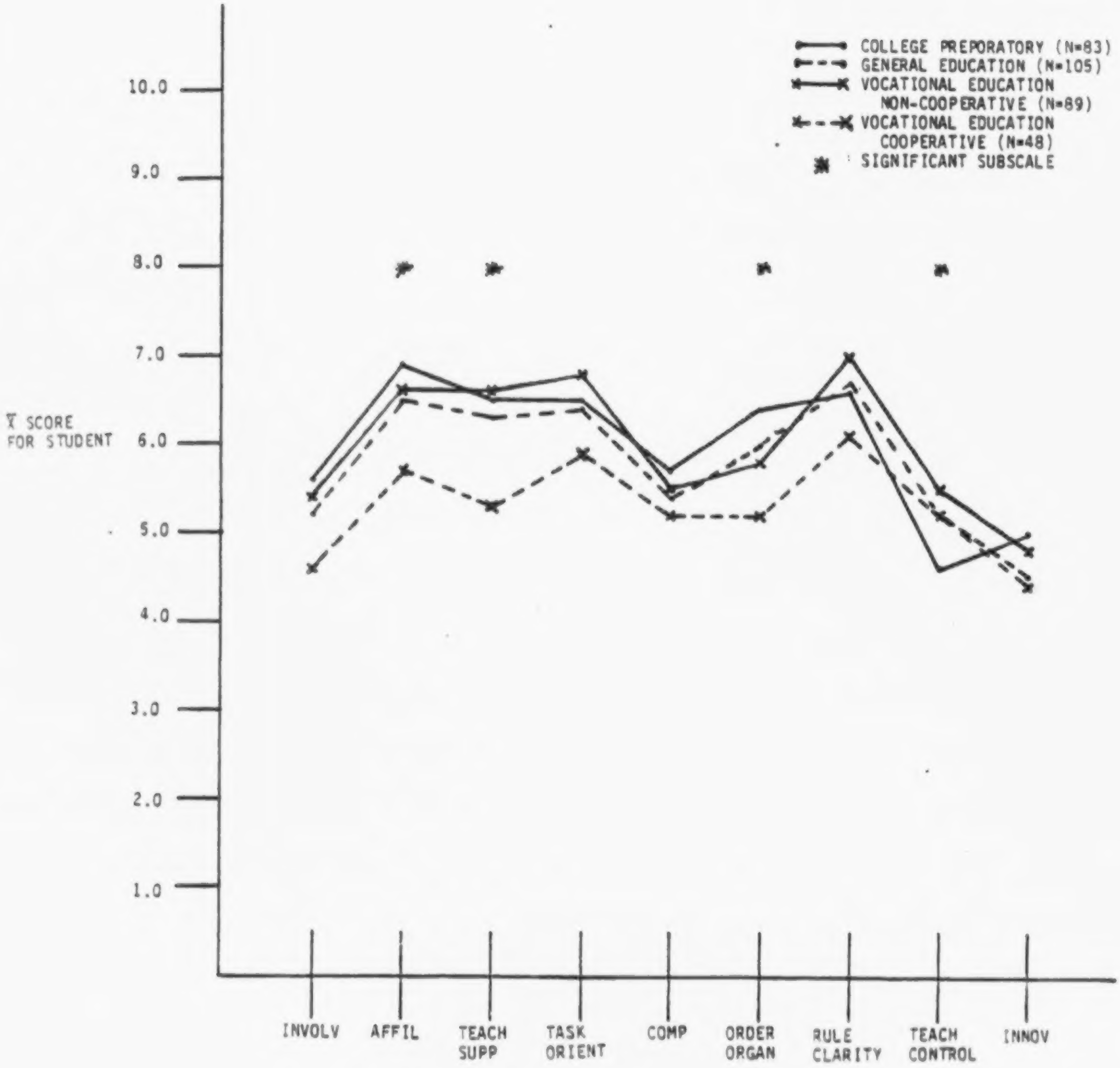

Figure B-3. Students' program mean scores for the CES subscales

TABLE B-4

EFFECTS OF SUBJECT MATTER ON STUDENTS' CLASSROOM PERCEPTIONS

	Analysis of Variance	Tukey Tests (Contrasts)					
CES Subscale	School Class Type	COE vs. MEC	COE vs. BC	COE vs. DSM	MEC vs. BC	MEC vs. DSM	BC vs. DSM
Involvement	X_1			X_1			X_1
Affiliation							
Teacher support	X_0						X_1
Task orientation	X_1			X_1	X_1		
Competition							
Order & organization	X_2	X_1		X_1			
Rule clarity							
Teacher control	X_1					X_1	
Innovation							

KEY:

$X_0 < .10$
$X_1 \leq .05$
$X_2 \leq .01$

COE:	COE class (N = 51 students)
MEC:	Marketing Education Class (N = 60 students)
BC:	Banking Class (N = 55 students)
DSM:	Department Store Marketing Class (N = 22 students)

order and organization - between the COE class and the
marketing education class
- between the COE class and the department store
marketing class

teacher control - between the marketing education class and
the department store marketing class

Figure B-4 illustrates the subject matter means for the students across the nine subscales. The figure also illustrates the generally lower scores for the department store marketing class. If the data from this particular classroom were eliminated from the vocational co-op program, then this program would be more comparable to the other programs across most of the nine subscales.

Teachers' Perceptions of Classroom Environments

A total of 161 teachers from 168 classrooms were sampled. From the college preparatory program, 49 teachers rated 52 classrooms. From the general education program, 88 teachers rated 92 classrooms. From the vocational nonco-op program, 15 teachers rated 15 classrooms. From the vocational co-op program, nine teachers rated nine classrooms. The means and standard deviations for the CES Form R subscales are listed in table B-5. Both the published normative data and the program data are presented for comparison.

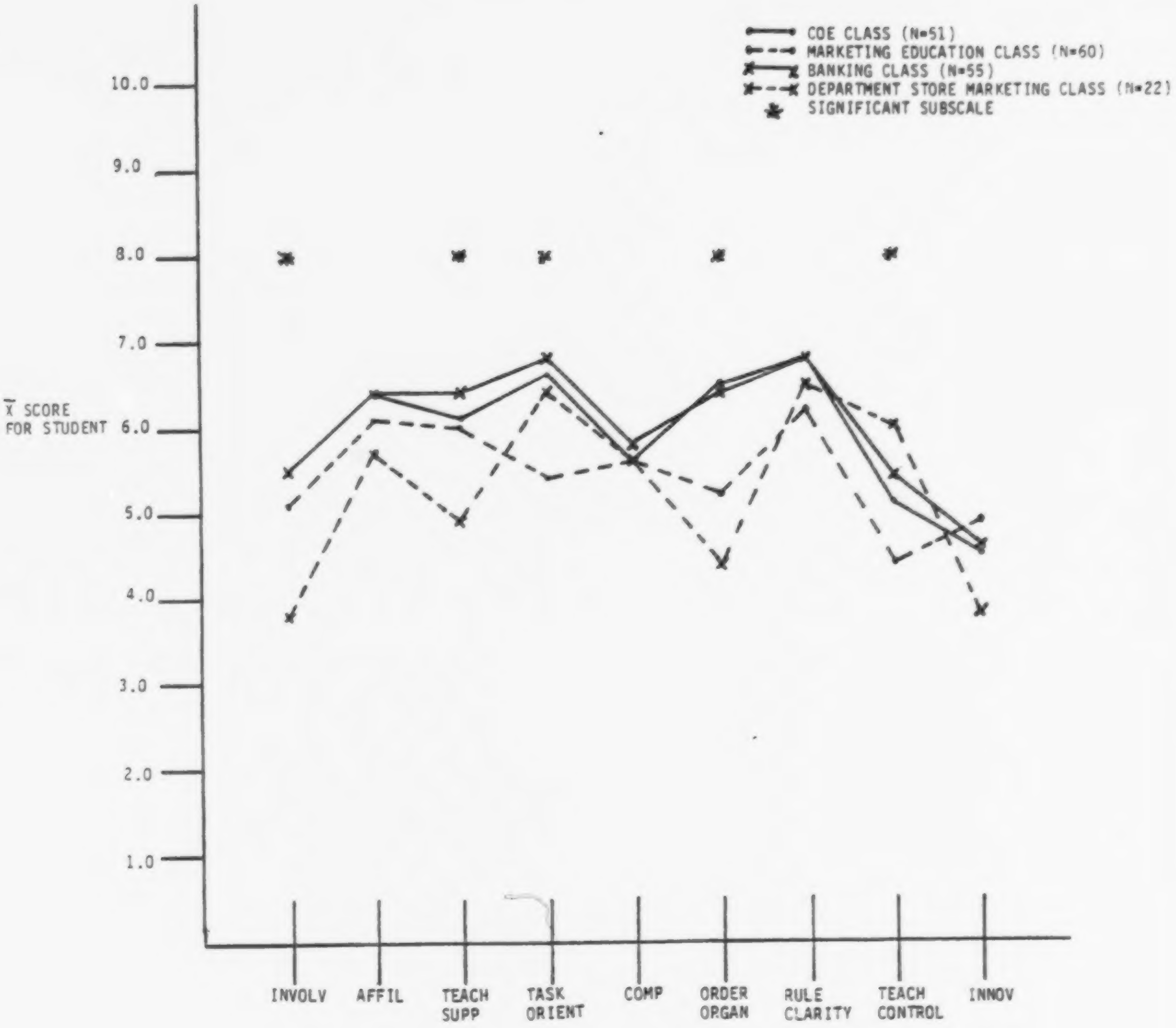

Figure B-4. Students' subject matter mean scores for the CES subscales

TABLE B-5

COMPARISON OF TEACHER CES MEANS TO NORM CES MEANS

Subscale	Teacher Norms N=189		College Preparatory Teachers N=49		Gen. Ed. Teachers N=88		Nonco-op Teachers N=15		Co-op Teachers N=9	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Involvement	6.72	2.67	7.41	2.26	6.33	2.63	7.80	2.37	7.00	2.40
Affiliation	7.30	2.32	7.86	2.06	6.60	2.41	8.13	1.46	7.44	2.13
Teacher support	8.07	1.68	7.84	1.52	7.44	1.76	8.20	1.32	8.11	1.17
Task orientation	6.76	2.48	8.22	1.95	7.66	2.08	7.73	1.67	7.44	2.70
Competition	5.72	2.24	6.87	1.94	5.74	1.85	7.13	2.33	5.78	2.64
Order/organization	6.74	2.55	8.20	1.47	7.99	1.91	7.60	2.26	7.11	2.37
Rule clarity	7.86	2.12	8.69	1.66	8.90	1.38	9.47	0.92	8.11	1.69
Teacher control	3.72	2.33	6.08	2.29	5.97	2.28	6.60	2.41	6.11	2.42
Innovation	5.31	2.65	4.90	2.62	4.73	2.44	6.00	1.73	6.44	1.74

Within the 168 different classrooms, the number of teachers who rated different kinds of classes are as follows:

- English - 46
- Science - 16
- Social studies or history - 45
- Clerical/COE/banking - 7
- Distributive education/marketing education/department store - 6
- Home economics/industrial arts - 2
- Automotive technology - 1
- Other types - 9

Scores for each CES subscale were computed for each teacher. The data were then analyzed using one-way ANOVA procedure for program and class type effects.

Significant differences were found among school programs on 3 of the 9 subscales--involvement, $F(4,157) = 254$, $p < .05$; affiliation, $F(4,157) = 3.52$, $p < .009$; and competition, $F(4,157) = 3.93$, $p < .005$. Tukey contrasts found significant differences ($p < .05$) between the college preparatory and the general education programs for affiliation and competition. Table B-6 provides a summary of the statistical results. These results indicate that college preparatory teachers perceived higher levels of friendship and helpfulness among their students, and more competition for grades and recognition in their classrooms than did general education teachers. Figure B-5 illustrates the teacher program means across the nine CES subscales. Teachers' perceptions of the classrooms appear to follow basically similar trends despite differences in school program.

TABLE B-6

EFFECTS OF PROGRAM ON TEACHERS' CLASSROOM PERCEPTIONS

	Analysis of Variance	Tukey Tests (Contrasts)					
CES Subscale	School Programs (P_1, P_2, P_3, P_4)	P_1 vs. P_2	P_2 vs. P_3	P_1 vs. P_4	P_2 vs. P_3	P_2 vs. P_4	P_3 vs. P_4
Involvement	X_1						
Affiliation	X_2	X_1					
Teacher Support							
Task Orientation							
Competition	X_2	X_1					
Order & Organization							
Rule Clarity							
Teacher Control							
Innovation							

KEY:

$X_1 \leq .05$
$X_2 \leq .01$

P_1: 49 teachers, 52 classrooms - College Preparatory
P_2: 88 teachers, 92 classrooms - General Education
P_3: 15 teachers, 15 classrooms - Vocational, Nonco-op
P_4: 9 teachers, 9 classrooms - Vocational, Co-op

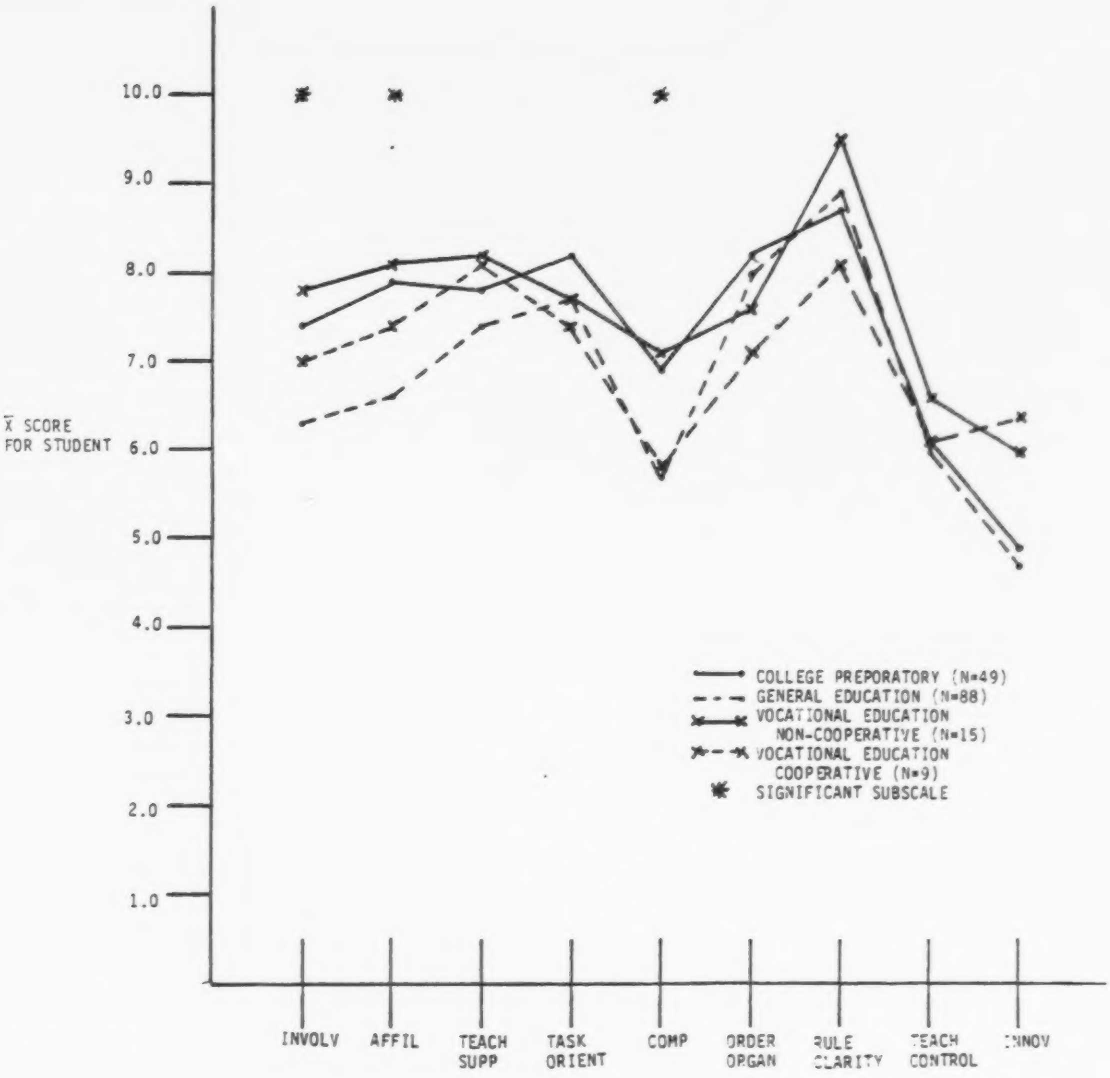

Figure B-5. School program mean scores of teachers for the CES subscales

An analysis of the effect of class type, similar to that done earlier for students, revealed no significant differences for teachers. Figure B-6 illustrates the teacher means for the same classes that were found to be significantly different among students. Perceptual trends of the teachers were very similar across the four classes, indicating that class type had no effect upon teachers' perceptions. Students' perceptions, however, did differ with class type.

Students' Perceptions of Work Environments

A total of 163 students completed the Work Environment Scale (WES)--120 vocational co-op students and 43 students with non-school-related part-time jobs. The WES has 10 subscales composed of 90 items that students score as true or false. The description of the 10 subscales is presented in table B-7. The means and standard deviations for the WES Form R subscales are given in table B-8. Both the published normative data and the data obtained from this study are presented for comparison. Neither the vocational co-op students nor the students with part-time jobs differed grossly from the published norms. Scores for each of 10 WES subscales were computed for each student. The data were then analyzed using a one-way ANOVA procedure for race, sex, and work situation effects. It should be noted that, to some extent, a selection bias may exist in the WES data since students had the option not to complete the instrument.

A significant racial difference was found for the peer cohesion subscale, $F(1,157) = 5.25$, $p < .03$. Whites ($N = 94$) averaged 6.1, whereas blacks ($N = 65$) averaged 5.4 (see table B-7). The higher scores of the white students indicated that they

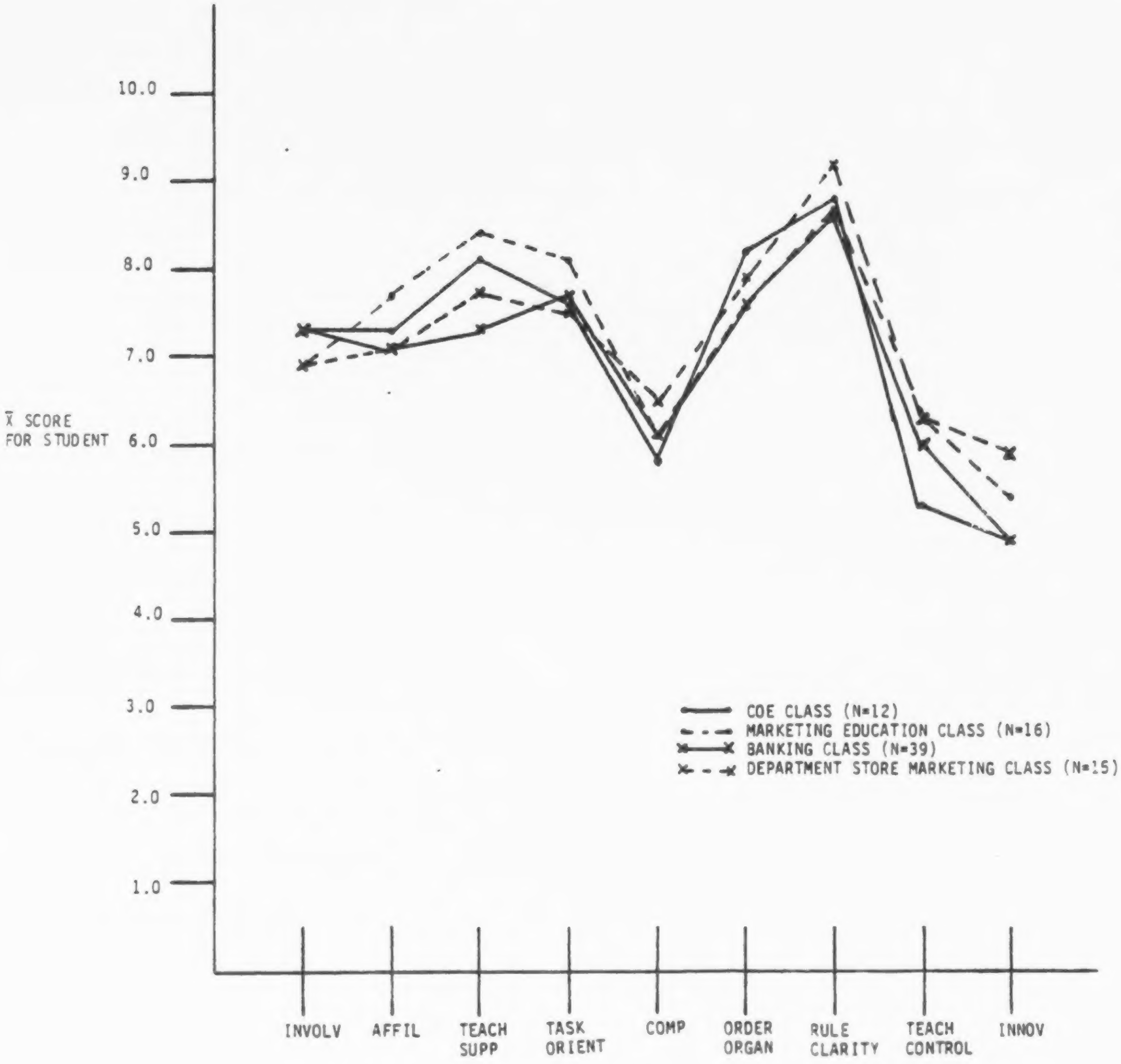

Figure B-6. Vocational teachers' mean scores of vocational classes for the CES subscales.

TABLE B-7

WES SUBSCALE DESCRIPTIONS

1. Involvement - the extent to which employees are concerned about and committed to their jobs.

2. Peer Cohesion - the extent to which employees are friendly and supportive of one another.

3. Supervisor Support - the extent to which management is supportive of employees and encourages employees to be supportive of one another.

4. Autonomy - the extent to which employees are encouraged to be self-sufficient and to make their own decisions.

5. Task Orientation - the degree of emphasis on good planning, efficiency, and getting the job done.

6. Work Pressure - the degree to which the press of work and time urgency dominate the job milieu.

7. Clarity - the extent to which employees know what to expect in their daily routine and how explicitly rules and policies are communicated.

8. Control - the extent to which management uses rules and pressures to keep employees under control.

9. Innovation - the degree of emphasis on variety, change, and approaches.

10. Physical Comfort - the extent to which the physical surroundings contribute to a pleasant work environment.

SOURCE: Moos (1981).

TABLE B-8

COMPARISON OF STUDENT WES MEANS TO NORM WES MEANS

	Norms				Student Means			
Subscale	General Work Group		Health-Care Work Group		Co-op Work Group		Part-Time Work Group	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Involvement	5.95	1.41	5.56	1.54	5.64	2.42	4.47	2.45
Peer cohesion	5.70	1.15	5.22	1.40	5.92	1.91	5.42	2.21
Supervisor support	5.68	1.38	4.99	1.40	5.05	2.29	4.63	2.19
Autonomy	5.54	1.22	4.98	1.46	5.42	1.94	5.12	1.92
Task orientation	5.90	1.29	5.63	1.31	6.10	2.12	5.84	2.02
Work pressure	4.40	1.38	4.87	1.57	4.95	1.97	5.02	1.97
Clarity	5.60	1.29	4.44	1.41	5.81	2.10	5.14	2.23
Control	4.88	1.33	5.43	1.42	5.90	1.75	5.40	2.03
Innovation	4.42	1.54	4.37	1.82	4.31	2.09	3.79	1.97
Physical comfort	4.89	1.35	3.72	1.28	4.63	2.33	4.81	1.38

perceived their fellow employees as more friendly and supportive of one another than did black students. Figure B-7 illustrates the means of the 10 subscales for whites and blacks. The two races exhibit virtually identical trends with the exception of the first three subscales. However, a statistically significant difference between races was found for only one of these three subscales.

Significant gender differences were found for the involvement subscale, F(1,157) = 7.80, $p < .006$; the peer cohesion subscale, F(1,157) = 4.18, $p < .05$; the task orientation subscale, F(1,157) = 8.66, $p < .004$; and the rule clarity subscale, F(1,157) = 10.15, $p < .002$. Females (N = 114) scored statistically higher on all 4 of the subscales than did males (N = 45). Females also had a tendency to score higher than males on the six remaining subscales. Table B-9 provides a list of the means for the statistically significant results. These results indicate that females experienced more commitment toward their jobs, more support and friendliness among their fellow employees, greater efficiency and rate of completion of work, and more clarity in their daily routine--as well as in rules and policies--than did males. Figure B-8 illustrates the means for the 10 WES subscales for males and females.

A significant job situation difference (i.e., co-op job versus part-time job) was found for the involvement subscale, F(1,161) = 7.41, $p < .008$. Vocational co-op students averaged a score of 5.6, whereas part-time working students averaged 4.5 (see table B-9). This result indicates that vocational co-op students

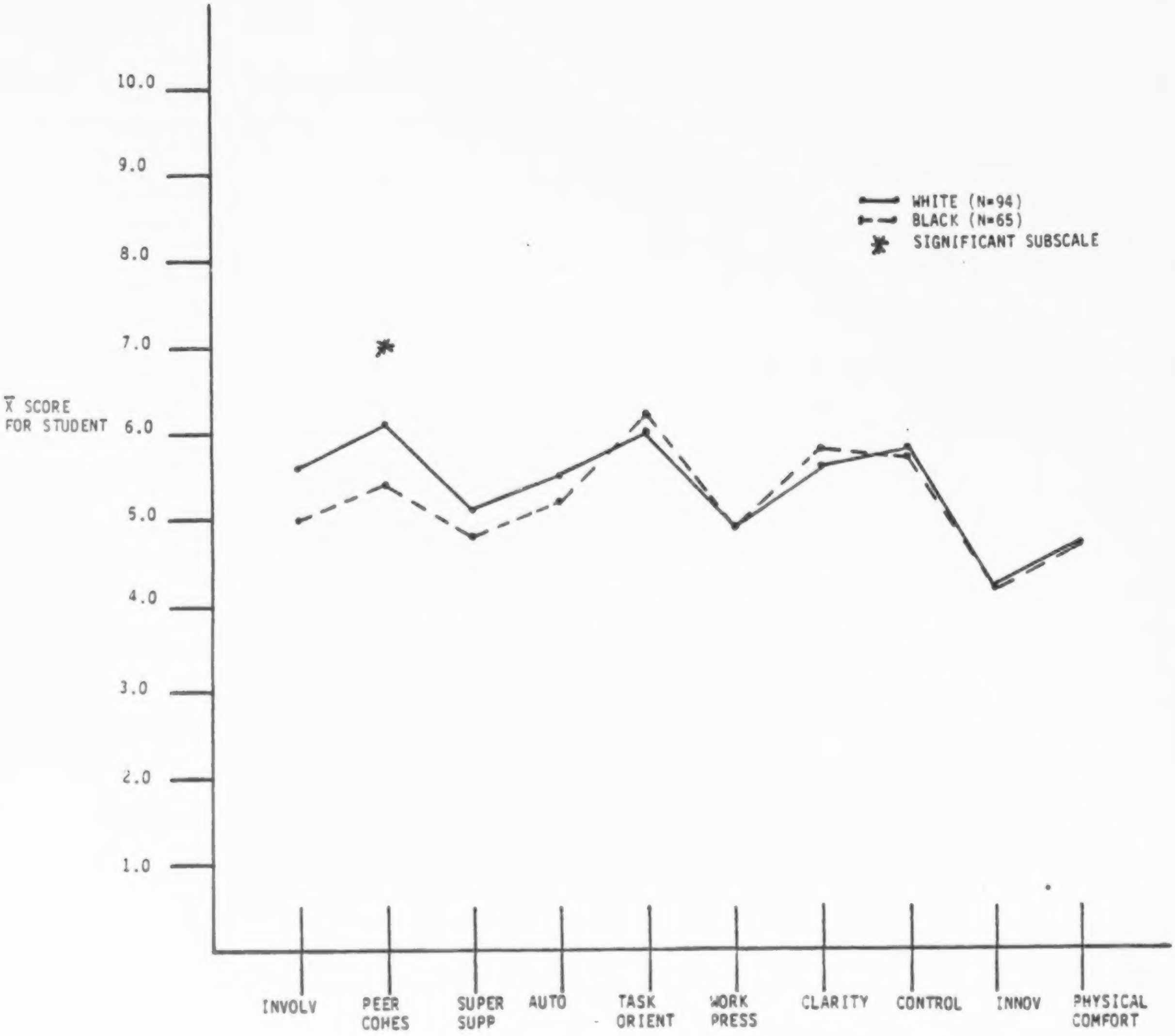

Figure B-7. Mean scores of whites and blacks for the WES subscales

TABLE B-9

SIGNIFICANT DIFFERENCES BETWEEN STUDENTS' WORKSITE PERCEPTIONS

Effect	WES Subscale	Mean 1	Mean 2	F-Value	Probability
Race	Peer cohesion	Caucasians X = 6.12 N = 94	Blacks X = 5.37 N = 65	5.25	.03
		Males N = 45	Females N = 114		
Gender	Involvement	X = 4.49	X = 5.69	7.80	.006
	Peer cohesion	X = 5.29	X = 6.01	4.18	.05
	Task orientation	X = 5.31	X = 6.37	8.66	.004
	Clarity	X = 4.82	X = 6.00	10.15	.002
Job situation	Involvement	Co-op Job N = 120 X = 5.64	Part-time Job N = 43 X = 4.46	7.41	.008
		COE Class N = 61 Marketing Education Class N = 59			

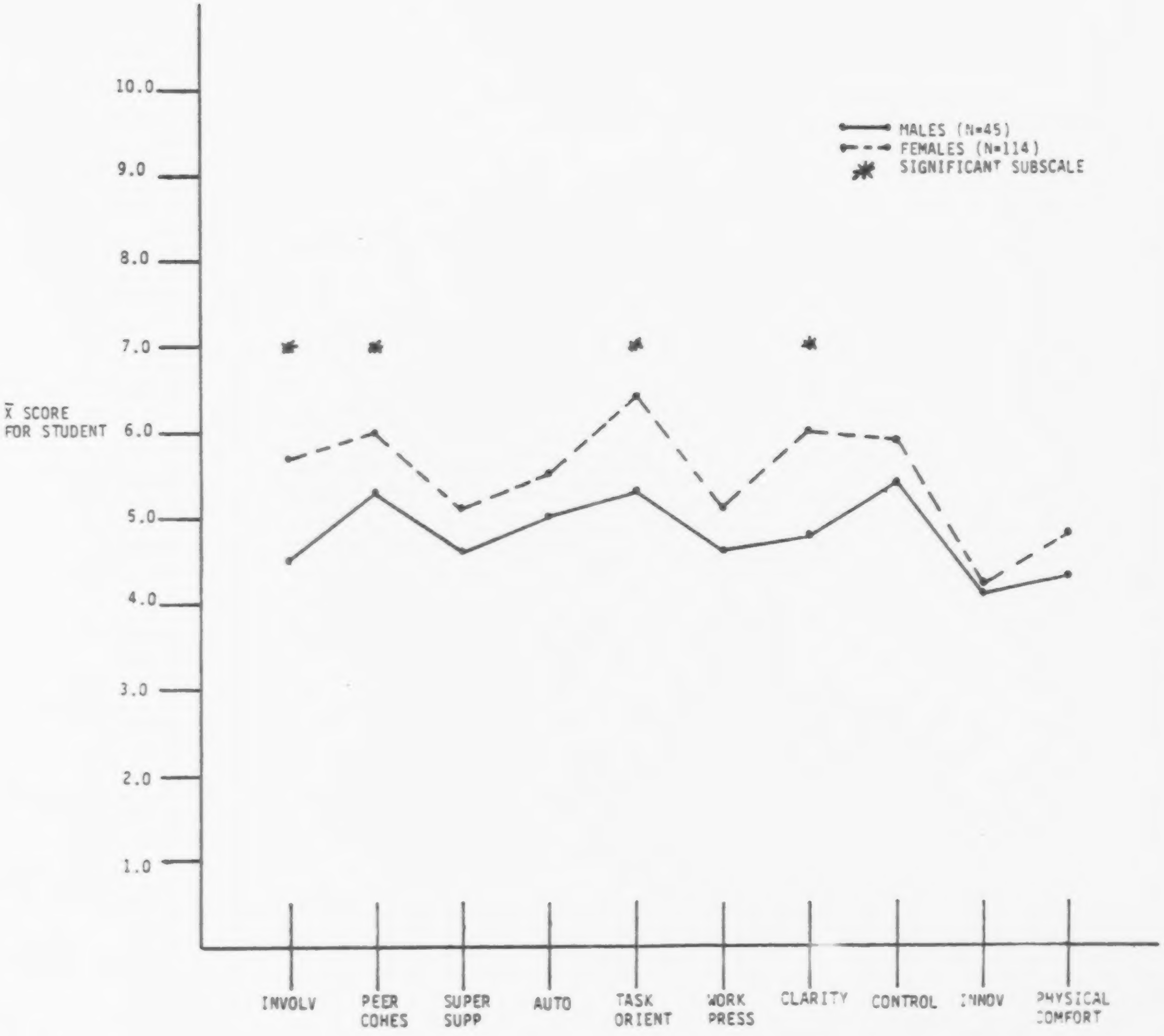

Figure B-8. Mean scores of males and females for the WES subscales

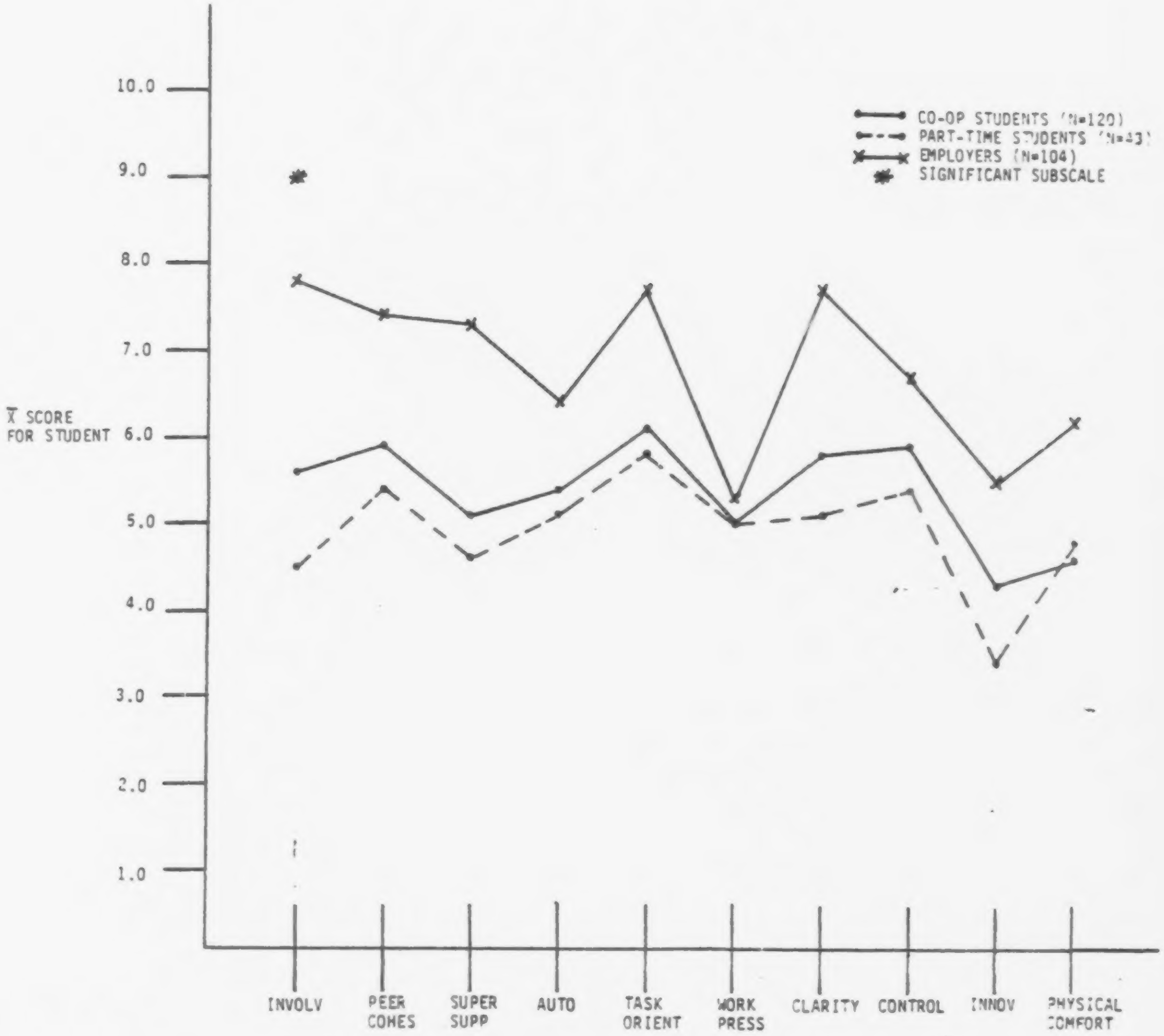

Figure B-9. Mean scores of co-op students, part-time work students and co-op employers for the WES subscales.

perceived themselves as being more concerned about and committed to their jobs than did students with part-time jobs. Figure B-9 illustrates the means for the 10 WES subscales for the 2 work site situations. The vocational co-op students had generally higher scores across all subscales than students with part-time jobs, with the exception of the physical comfort subscale.

A comparison between vocational co-op students' work site and classroom perceptions was carried out. This group's perceptions of the classroom were generally lower than those of groups in the other programs; a comparison between the two environments would help to determine whether or not co-op students' perceptions of the workplace were any higher on comparable subscales. Figure B-10 illustrates the means for the CES and WES subscales for vocational co-op students' classroom and work site perceptions. The students' mean scores were virtually the same regardless of the environment. Thus, vocational co-op students tended to perceive both environments in virtually identical ways.

Employers' Perceptions of Work Environments

A total of 104 workplace supervisors of the vocational co-op students completed the WES. Figure B-9 illustrates the means of the 10 subscales for the supervisors; it also compares the supervisors' scores to those of the the two student groups. Supervisors tended to perceive the work site environment at dramatically higher levels on the 10 subscales than did students. The only exception is the work pressure subscale. Both students and supervisors similarly perceived the press of work and time

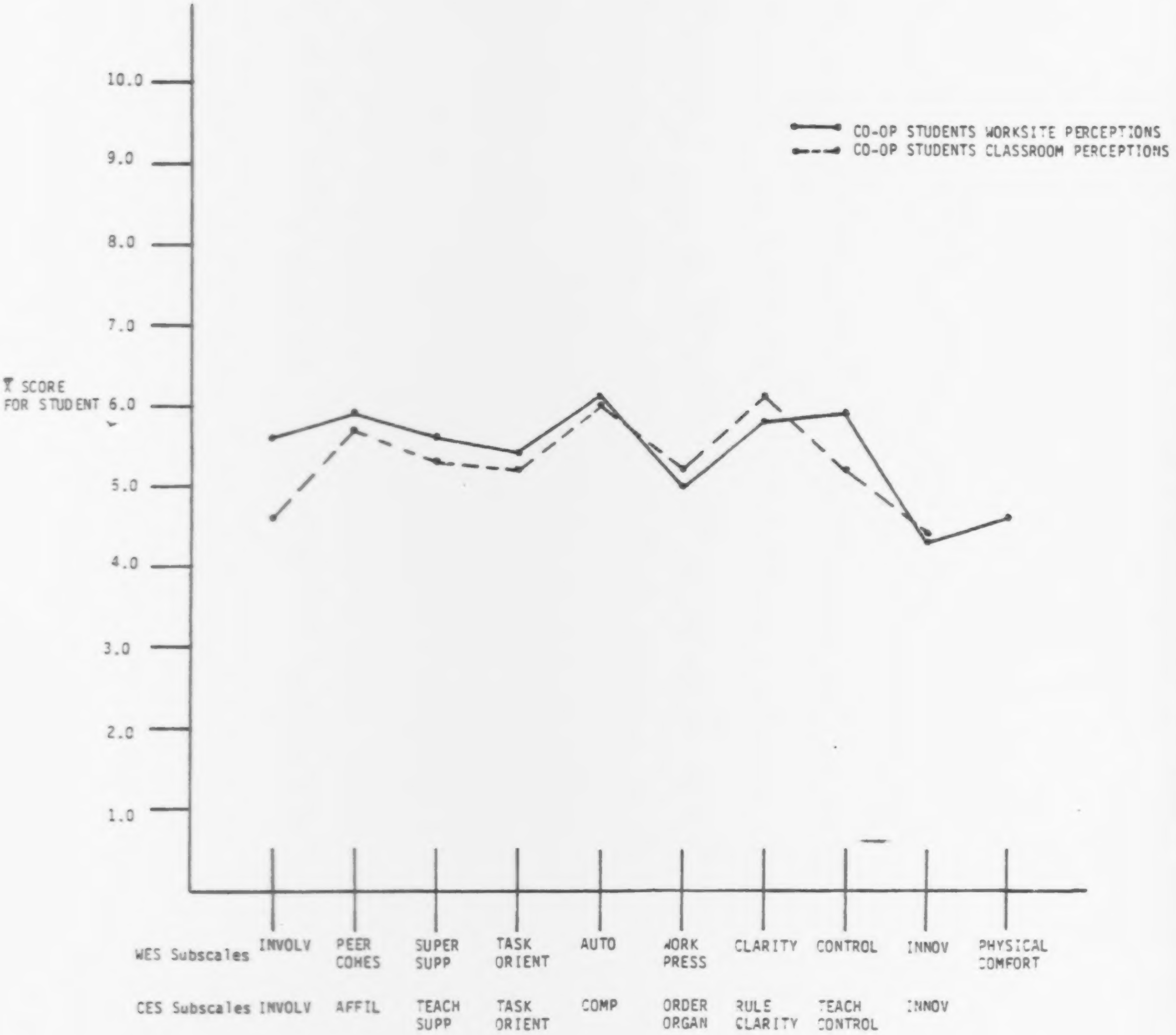

Figure B-10. Mean scores of co-op students for the CES and WES subscales urgency. However, supervisors had scores ranging from 5.5 to 7.8 for the remaining subscales, whereas the students had scores ranging from 3.4 to 6.1. These results, therefore, indicate that students and supervisors did not perceive the work site in a similar fashion, with the exception of the work pressure subscale.

APPENDIX C

SUMMARY OF THE OBSERVATIONAL METHODOLOGY

The description of the observational methodology is presented in chapter 2. A summary is provided here to assist the reader. An observational method was developed that permitted a description of learning environments in terms of variables that could be quantified at least at the ordinal level of measurement. The study's focus on environmental characteristics affecting basic skills acquisition required that students be observed and their behavior be described as it occurred in actual learning environments.

This observation technique was a task episode analysis approach to identify the processes by which students encounter and accomplish tasks, the general features of the environment, and their impact on learning. The unit of analysis is the "task episode," defined as a segment of time in which an individual's attention remains focused on the completion of a particular task. The task episode is event dependent rather than time dependent. It may consist, for example, of a series of events in which a student encounters a problem, works on it, and receives information about the quality of performance. The length of the task episode is a function of the type of activity being performed; it is not, therefore, dependent on any arbitrary unit of time.

Collection of Data

Observers underwent 16 hours of training with task staff using videotapes of actual school and work site environments as training materials. When the assignment of observers was carried out, observers were assigned to all programs, schools, and as wide a variety of work sites as was feasible in order to prevent any bias toward a particular program.

Observations were obtained for four programs--college preparatory, general education, vocational nonco-op, and vocational co-op. Overall, 360 observations were secured for the four programs. Table C-1 displays the number and percentage of observations obtained for each program, and for the classroom and work site settings observed in the vocational co-op program.

All but 60 of the observations were obtained in classroom settings. Of these, 13.33 percent were obtained in math classes, including college preparatory and general education classes; 26.67 percent were obtained in English classes, including college preparatory and general education classes; 13.33 percent were obtained in social studies classes, including college preparatory and general education classes; 10.67 percent were obtained in vocational nonco-op banking classes; 9.33 percent were obtained in vocational co-op marketing education classes; 6.67 percent were obtained in vocational nonco-op department store marketing classes; and 6.67 percent were obtained in vocational nonco-op automobile technology classes. The remaining 60 observations (16.67 percent of the total) were obtained at vocational co-op

TABLE C-1

NUMBER AND PERCENTAGE OF OBSERVATIONS BY PROGRAM AND BY SETTING

Setting	Programs								Total	
	College Preparatory		General Education		Vocational Education Noncooperative		Vocational Education Cooperative			
	Number of Observations	% of Total Observations	Number of Observations	% of Total Observations	Number of Observations	% of Total Observations	Number of Observations	% of Total Observations	Number of Observations	% of Total Observations
Classrooms	80	22	80	22	80	22	60	17	300	83
Work sites	0	0	0	0	0	0	60	17	60	17
Totals	80	22%	80	22%	80	22%	120	34%	360	100%

work sites. No nonschool-related work sites were observed. A representative listing of vocational co-op work site placements is given in table C-2. Student jobs encompassed a range of complexity from being a maid at a motel or worker in a fast-food restaurant to being a medical receptionist or teller at a financial institute.

Scheduling Observations

To obtain a representative description of environments, observers conducted observations on different days of the week. Although observers attempted to obtain the observations on different days of the week and at different times of the day, the scheduling of observations was dependent on both the observers' schedules and the students' assignments at school and on the work site.

Observation Summary

The average length of time for the observations was 42.9 minutes with a standard deviation of 6.5 minutes. The first 180 observations were obtained during October and November, 1984, and the second 180 observations were obtained during March and April, 1985. T tests were conducted comparing the two sets of observations for significant differences on the variables listed in table C-3 for each of the four programs. Since significant differences at the $p < .05$ level were obtained in only 19.05 percent of the comparisons across the two time intervals, the

TABLE C-2

LISTING OF STUDENTS' JOB TITLES AND WORK ORGANIZATIONS

Job Titles*	Type of Organization
Distributive Education	
Cashier (5)	Retail store
Clerk (19)	Retail store
Salesperson (5)	Retail store
Food service worker (21)	Restaurant
Pharmacy technician (1)	Pharmacy
Warehouse worker (2)	Retail store
Air conditioning serviceperson (1)	Retail store
Maid (1)	National motel chain
Dietary aide (2)	Health care facility
Lottery operator (1)	Retail store
Check writer (1)	Retail store
Stockperson (2)	Retail store
Cooperative Office Education	
Clerk (3)	Law office
Clerk (4)	Federal government
Clerk (8)	State government
Typist (2)	Law office
Secretary (1)	Church
Clerk (2)	Retail store
Clerk (3)	Manufacturing company
NA-Operator trainee (2)	Insurance company
Cooperative student (2)	Mining company
Clerk typist (1)	Publishing company
Secretary (1)	Insurance company
NA-Support person (1)	Credit service
Secretary (1)	Credit service
Typist (1)	Contact lens laboratory
Bookkeeper (1)	Contact lens laboratory
Teller (2)	Financial institution
Clerk (1)	Social service
Co-op student (1)	Industrial procurement
Receptionist (1)	Retail company
Clerk (2)	Insurance company
Clerk (1)	National restaurant chain
Secretary/clerk (1)	Private country club
Student employee (4)	Education organization
Receptionist (1)	Manufacturing company
Medical receptionist (1)	Health care facility
Pharmacy technician (1)	Hospital
Clerk (1)	Computer service

*Numbers in parentheses are the number of students with similar job titles.

TABLE C-3

DEFINITIONS OF OBSERVATIONAL VARIABLES

Environmental Factors

Articulation	How a task episode relates to other tasks performed at the organization. If other students/workers rely on the student to complete a task before commencing their own, it is an articulated task episode.
Autonomy	The degree of flexibility that the student has in carrying out the task.
Coordination	Extent to which task episodes require the student to carry out a wide variety of tasks, cope with interruptions, and carry out more than one task simultaneously.
Feedback	Extent to which the student receives direct and clear information about the effectiveness of his or her performance.
Importance	The degree to which carrying out the required tasks will have an impact on the life of the student, other people, and the organization.
Initiator	Who initiated the task episode.
Instruction	The proportions of student prescription and discretion in task episode performance.
Major task episodes	The number of major categories used to determine/identify task episodes.
Simultaneity	Two or more task episodes (or parts of task episodes) being done at the same time.
Split task	The task episode in which the student is interrupted before the task is completed but which the student returns to complete later.
Support	The availability of other people for assistance or instruction.

Basic Skills Development Scales

Language skills	The overall level of task episode requirements for the student to read, write, and speak, ranging from reading or repeating simple phrases to reading or composing complex sentences.
Mathematical skills	The level of task episode requirements for the student to deal with mathematical problems and operations, ranging from copying numbers to performing higher order mathematical procedures.

TABLE C-3--Continued

Reading skills	The level of task episode requirements for the student to read materials, ranging from reading simple instructions to complex sources of information.
Reasoning skills	The level of task episode requirements for the student to deal with theory vs. practice or abstract vs. concrete situations.
Speaking skills	The level of task episode requirements for the student to speak, ranging from speaking simple sentences to sophisticated presentations.
Writing skills	The level of task episode requirements for the student to write, ranging from writing simple sentences to detailed or elaborate papers.
Attentional Measures	
Data function	The level of information, ideas, and facts used by the student.
People function	The level of the student's interaction with students, co-workers, teachers, or supervisors.
Things function	The level of the student's physical interaction with objects (e.g., typewriters, cash registers, drafting tools).
Data orientation	The percentage of the student's involvement with data in contrast to people and things.
People orientation	The percentage of the student's involvement with people in contrast to data and things.
Things orientation	The percentage of the student's involvement with things in contrast to data and people.

SOURCE: Adapted from U.S. Department of Labor, Manpower Administration (1972).

decision was made to combine the two sets of 180 observations into one set of 360 observations.

Analytic Strategy

The variables presented in table C-3 (which also appears in chapter 2) were initially partitioned in two ways for purposes of analysis. The following variables were used as summary variables: importance, coordination, support, feedback, instruction, and the number of major task episodes. These variables are referred to as "summary" observation variables since they were scored only once per observation--that is, they were intended to describe the observation as a whole rather than each task episode. Therefore, results for the summary variables are presented in terms of proportion of observations in which they were present. All the remaining variables are referred to as "task episode" variables since they were scored for every task episode within each observation.

Results are presented in three ways: (1) the proportion of observations for which some level of a summary variable other than zero was present, (2) proportion of task episodes for which some level of a task episode variable other than zero was present, and (3) the mean values for both summary and task episode variables.

Chi square tests were employed to uncover significant differences between programs in terms of the proportion of observations and task episodes in which some level of an observation task episode variable other than zero was present. For purposes of the analysis, two matrices were formed for each variable. Both matrices contained two columns, one indicating the frequency of nonoccurrence and the other indicating the frequency of occurrence of the variable. In one matrix, comparisons were made among the four previously identified school programs, whereas in the second matrix comparisons were made between college preparatory, general education, vocational nonco-op, vocational co-op classrooms, and vocational co-op work site settings. In the case of several of the variables, the assumptions that underlie the chi square test were violated. Specifically, a sufficient number of the cells in the matrix had an expected frequency less than 5, which could lead to spurious significance in some cases. Where this problem arises, it will be noted in the presentation of the findings.

Secondly, analyses of the means for each variable were accomplished by carrying out one-way analyses of variance. It was then possible to test for specific significant differences between school programs by employing the Tukey comparison test for each variable.

Overview of the Findings

The long-range goal of this research is to address the question of which vocational education student learns which basic skill best in what environment or setting. Part of this effort involves describing the environments within which students acquire basic skills. The issue is whether settings differentially emphasize exposure to basic skills and exhibit different patterns of environmental and attentional factors that ultimately affect student's basic skills development. This section presents the findings from the observational data and is organized around four main topics:

- What are the relationships between exposure to basic skills and programs and settings?
- What are the relationships between attentional variables and programs and settings?
- What are the relationships between environmental variables and programs and settings?
- What are the relationships between exposure to basic skills and environmental and attentional variables?

Distribution of the Task Episodes

In this data set, 1,513 task episodes were identified. Of this number, 10.24 percent were classified as nontask related (e.g., eating, socializing). The remaining 89.76 percent (or 1,358) of the task episodes were classified as related to carrying out an assignment at school, or doing the job at the work site, or otherwise doing activities designed to accomplish the mission or productive goals of the organization. It is these latter task episodes that are of interest for this report. Table C-4 displays the distribution of task episodes for each program and setting. Of the 1,358 task episodes, 517 (or 38 percent) were identified for work settings, and the remaining 841 (or 62 percent) were identified for classroom settings. This pattern is a function of the greater number of major task episode categories observed in each work site observation as compared to each classroom observation. Tukey contrast tests (see table C-12 later in this appendix) indicated that the average number of major task episode

TABLE C-4

PERCENTAGE OF TASK EPISODES FOR PROGRAMS AND SETTINGS

Settings	N	Programs				Total
		College Preparatory P_1 %	General Education P_2 %	Vocational Education Nonco-operative P_3 %	Vocational Education Cooperative P_4 %	%
Classroom	841	24	23	31	22	100%
Work site	517	0	0	0	100	100%
Total	1358	15	14	19	52	100%

categories for the work site observations was statistically greater than that for the classroom observations.

Overall Perspective

Before considering the observed relationships, the reader might benefit from an overall perspective of the data set. Table C-5 shows the distribution of task episodes and observations for all programs and settings related to basic skills usage and the environmental and attentional factors. Table C-3 provides definitions of the basic skill, environmental, and attentional factors. With regard to basic skills exposure, reasoning and language were most frequently present in the task episodes; writing and math skills were least frequently present or required to complete a task episode. Exposure to using the basic skills of speaking and reading was present in about one-half to two-thirds of the task episodes, respectively.

With regard to the environmental factors, it is important to distinguish between the summary observation variables (those variables that were scored only once for each observation) and the task episode variables (those variables that were scored for each task episode within each observation). In terms of the summary variables, the only environmental factor that was not present at some level in virtually all of the observations was feedback, which was present in 49 percent of the observations. Among the task episode variables, some exposure to autonomy, articulation, and initiation was present in virtually all of the task episodes.

TABLE C-5

PERCENTAGE OF TASK EPISODES OR OBSERVATIONS (FOR ALL PROGRAMS AND SETTINGS) EXPOSING STUDENTS TO BASIC SKILLS, ENVIRONMENTAL, AND ATTENTIONAL FACTORS

Basic Skills	Percent of Task Episodes* or Observations
Language	88
Reading	61
Mathematical	43
Speaking	56
Reasoning	96
Writing	39
Environmental Factors	
Autonomy	99
Articulation	19
Coordination**	99
Importance**	99
Initiation	97
Instruction**	99
Feedback**	75
Simultaneity	.7
Split task	26
Support**	99
Attentional Factors	
Data function	91
People function	85
Things function	86
Data orientation	90
People orientation	82
Things orientation	89

*Total number of task episodes is 1,358.

**Indicates summary observation variable. Number given is percentage of observations present.

On the other hand, 26 percent of the task episodes involved split tasks, and only .7 percent involved simultaneity.

Among the attentional factors, data function and data orientation were the most prevalent, being observed at some level in 91 percent and 90 percent of the task episodes, respectively. People function and people orientation were the least commonly noted attentional factors, being observed at some level in 85 percent and 82 percent of the task episodes, respectively. Thing function and thing orientation were midway between the above factors, being observed in 86 percent and 89 percent of the task episodes, respectively.

Relationships between Exposure to Basic Skills and Programs and Settings

Comparing Basic Skills Development in the Classroom and the Work Site

The most common means by which students acquire proficiency in basic skills is through classroom participation. In classroom settings the content is organized by academic disciplines and is taught by individuals trained in the discipline who generally design and direct students' learning activities. However, an alternative to the classroom in terms of the acquisition of basic skills is student participation in work site or "on-the-job" environments.

From the perspective of an employer, the purpose of a student's participation in his or her organization is to "do the work" which serves to meet the goals of the organization. From the perspective of school administrators and students, the purpose of participation by the student in an on-the-job environment is to gain firsthand knowledge of careers, practice the basic skills taught in the school environment in a "real-world" setting, and acquire academic credit toward a diploma for participating in workplace experiences. The specific nature of the interaction between the employer and student is determined by coordinating the dual goals of the school program and the employer's organization. However, a critical underlying assumption is that students will acquire and/or apply various basic skills within the context of the performance of their tasks in the work settings. Thus, the "content," or "curriculum," of the work site experience is defined by the nature of the work required of the student.

Teaching basic skills is the primary function of the classroom environment, whereas the application of basic skills to real-world tasks primarily characterizes work settings. However, the potential for basic skills acquisition in the work setting must not be overlooked. For purposes of this study, the level of exposure to basic skills should be considered as an indicator of the demand for the acquisition and/or application of basic skills encountered in various classroom and work site settings. If school programs and settings differentially emphasize the acquisition and application of a particular basic skill, then ultimately one would expect that students will demonstrate varying rates of growth in terms of achievement related to that basic skill, depending on the environment in which it is learned and/or applied. Thus, the intent of this area of inquiry is to examine the patterns of exposure to basic skills related to school programs and settings. Put succinctly, do school programs and settings differ with respect to exposure to basic skills?

Exposure and Participation Patterns

Tables C-6 and C-7 display the distribution of task episodes in which students were exposed to basic skills, and the mean level of the basic skill observed respectively. Both tables are partitioned into the four school programs under study; the vocational co-op program is further partitioned into its classroom and work site components. These tabular results are graphically displayed in figures C-1 through C-6. For each figure, the percentage of task episodes that required the use of the basic skill is shown on the left vertical axis (represented by the open bar), while the mean level of the basic skill for all task episodes within a given school program or observation site is displayed on the right vertical axis (represented by the striped bar).

As these figures illustrate, there are different patterns of exposure to basic skills as a function of a student's participation in a particular school program or setting. To determine if there were significant main effects for the various learning environments in terms of exposure to the basic skills, a series of chi square tests were performed with frequency of occurrence of basic skills being treated as the dependent variable. To determine if there were significant main effects for the various learning environments in terms of the mean level of

TABLE C-6

PERCENTAGE OF TASK EPISODES (BY PROGRAMS)
EXPOSING STUDENTS TO BASIC SKILLS

Programs	Basic Skills Exposure					
	Language %	Reading %	Mathematical %	Speaking %	Reasoning %	Writing %
College prep. N = 203	92	72	27	49	95	55
General education N = 192	88	69	24	50	92	49
Voc. ed. noncooperative N = 263	89	64	48	52	96	40
Voc. ed. cooperative N = 700	87	55	52	61	97	32
Voc. ed. cooperative classroom N = 183	85	69	34	41	90	48
Voc. ed. cooperative work site N = 517	88	50	58	69	99	26

TABLE C-7

MEANS (X) AND STANDARD DEVIATIONS (STD) OF TASK EPISODES (BY PROGRAMS) EXPOSING STUDENTS TO BASIC SKILLS

Programs	Basic Skills Exposure					
	Language $\bar{X}$ (STD)	Reading $\bar{X}$ (STD)	Mathematical $\bar{X}$ (STD)	Speaking $\bar{X}$ (STD)	Reasoning $\bar{X}$ (STD)	Writing $\bar{X}$ (STD)
College prep. N = 203	2.10 (1.21)	1.86 (1.50)	.94 (1.65)	.63 (.74)	2.96 (1.34)	.84 (.98)
General education N = 192	1.65 (1.05)	1.52 (1.33)	.63 (1.23)	.54 (.57)	2.51 (1.25)	.75 (.94)
Voc. ed. noncooperative N = 263	1.66 (1.03)	1.35 (1.23)	.71 (.91)	.62 (.65)	2.60 (1.40)	.55 (.82)
Voc. ed. cooperative N = 700	1.45 (.91)	.91 (1.11)	.61 (.66)	.94 (.85)	2.00 (1.03)	.52 (.91)
Voc. ed. cooperative classroom N = 183	1.78 (1.07)	1.57 (1.31)	.40 (.62)	.51 (.70)	1.79 (1.14)	.96 (1.20)
Voc. ed. cooperative work site N = 517	1.33 (.81)	.68 (.92)	.68 (.66)	1.09 (.84)	2.07 (.98)	.37 (.72)

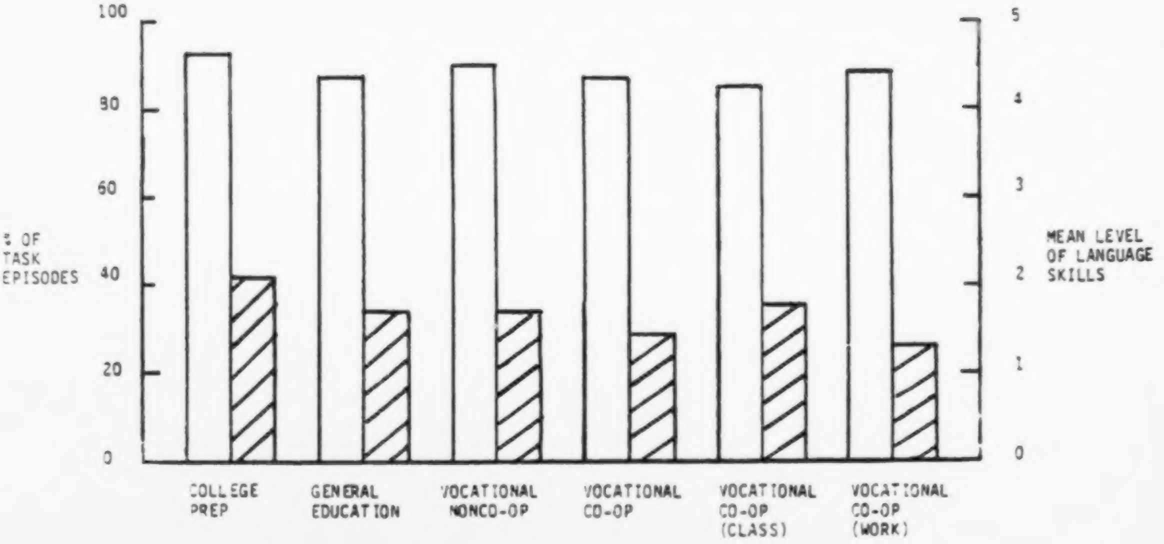

Figure C-1. Percentage of task episodes exposing students to language skills and mean level of language skills observed by school program.

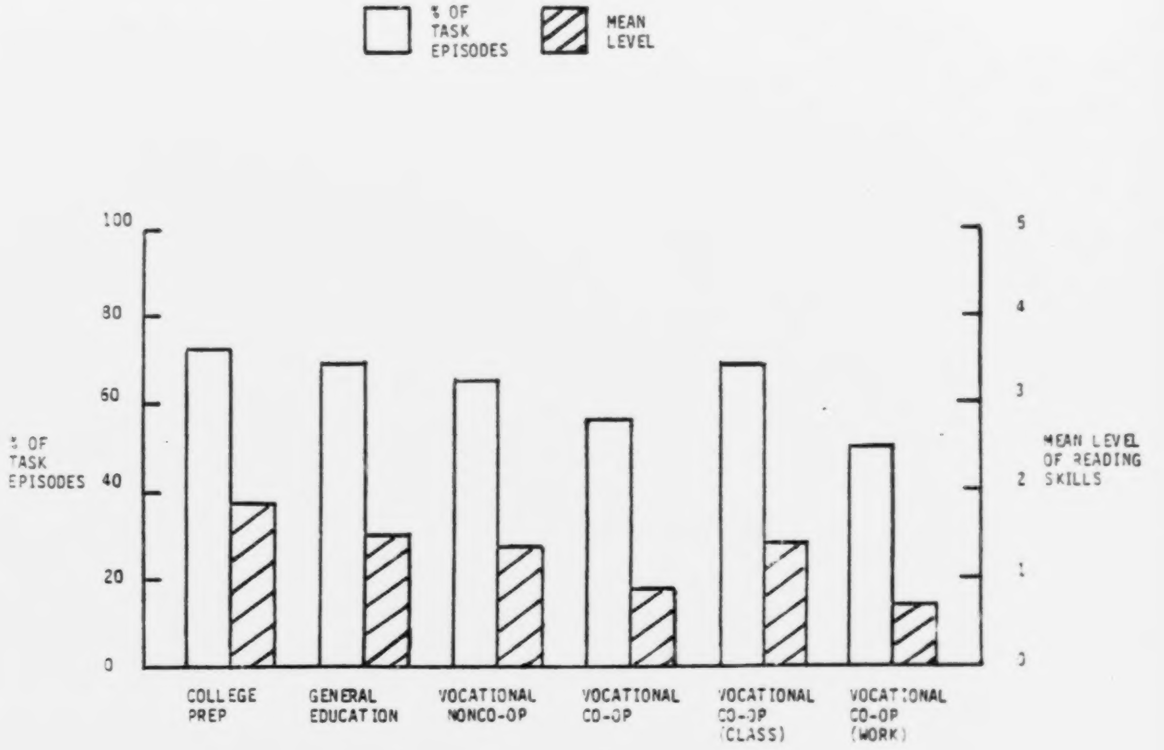

Figure C-2. Percentage of task episodes exposing students to reading skills and mean level of reading skills observed by school program.

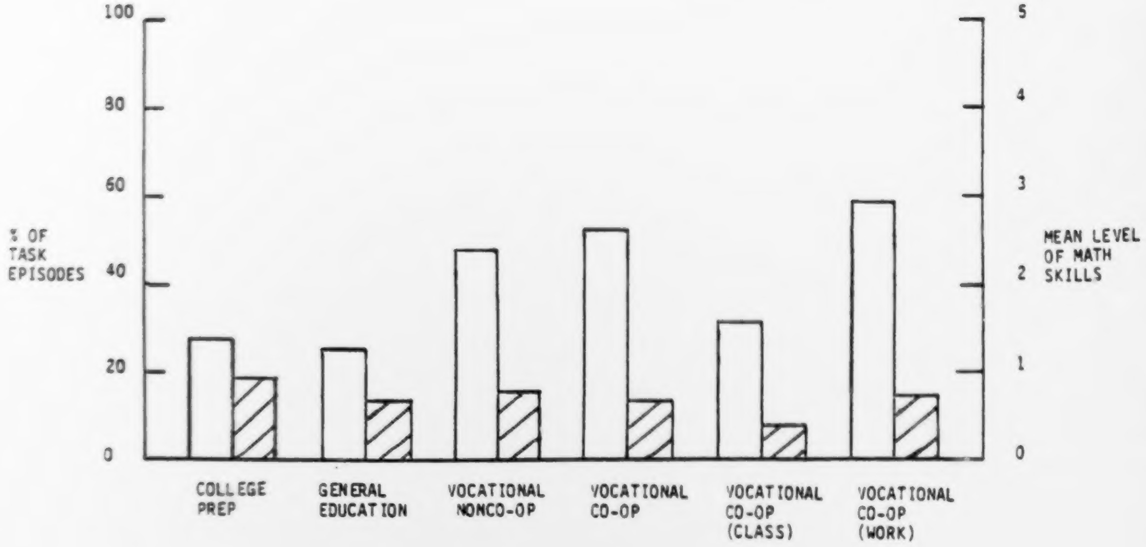

Figure C-3. Percentage of task episodes exposing students to math skills and mean level of math skills observed by school program.

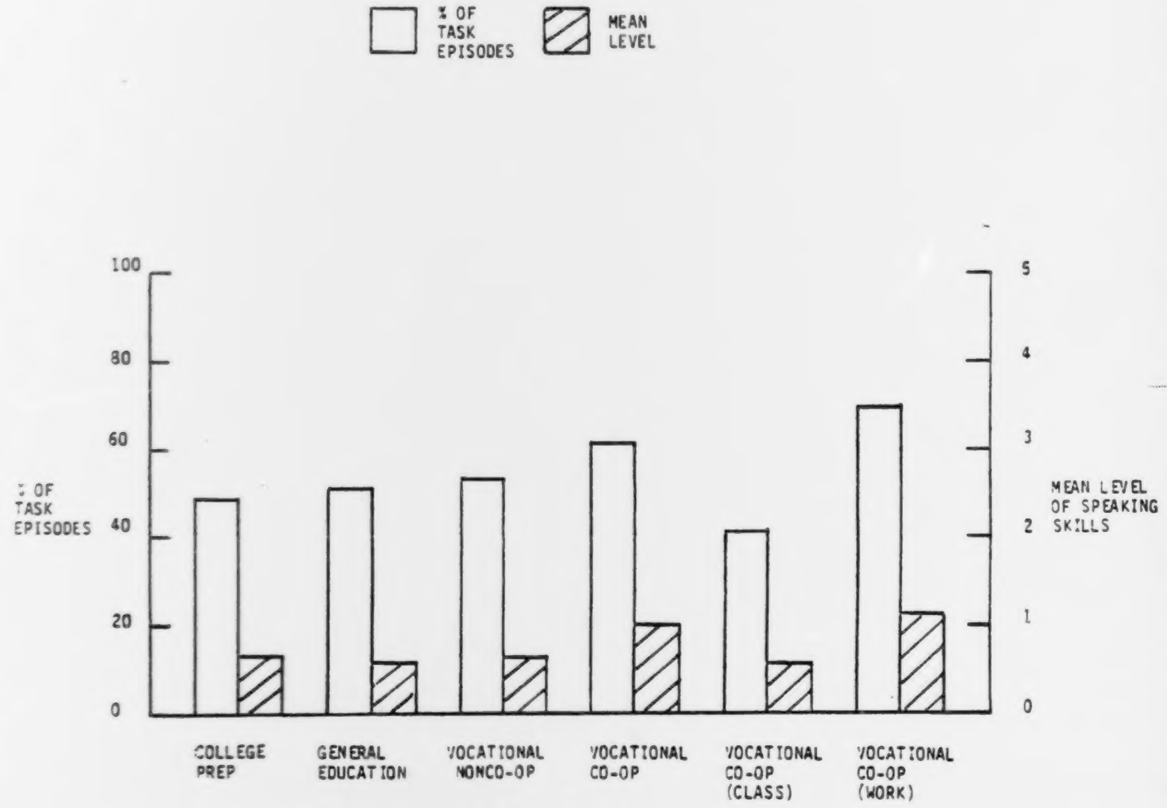

Figure C-4. Percentage of task episodes exposing students to speaking skills and mean level of speaking skills observed by school program.

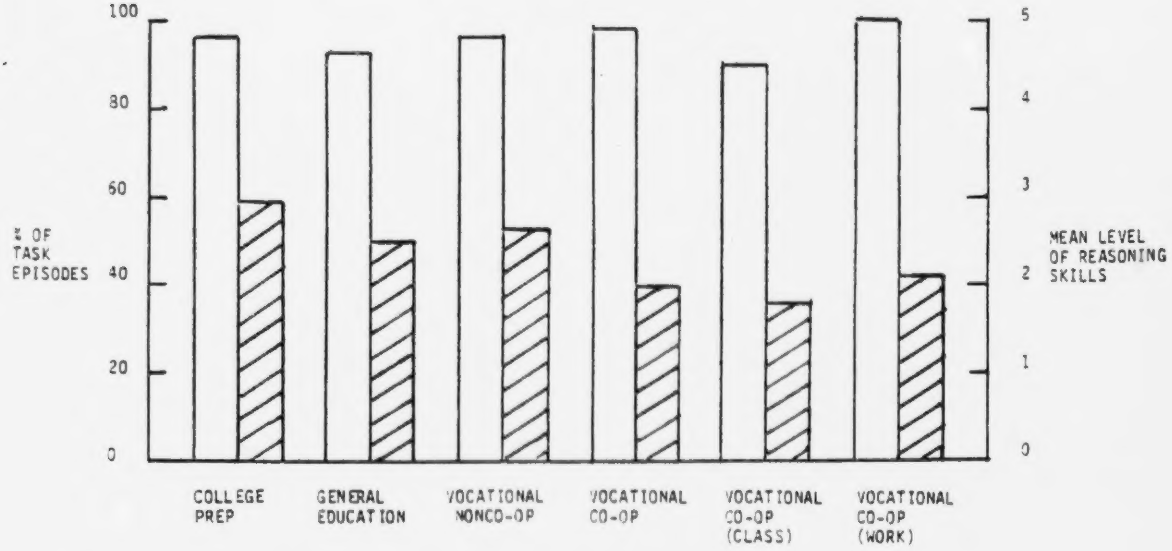

Figure C-5. Percentage of task episodes exposing students to reasoning skills and mean level of skills observed by school program.

□ % OF TASK EPISODES ▨ MEAN LEVEL

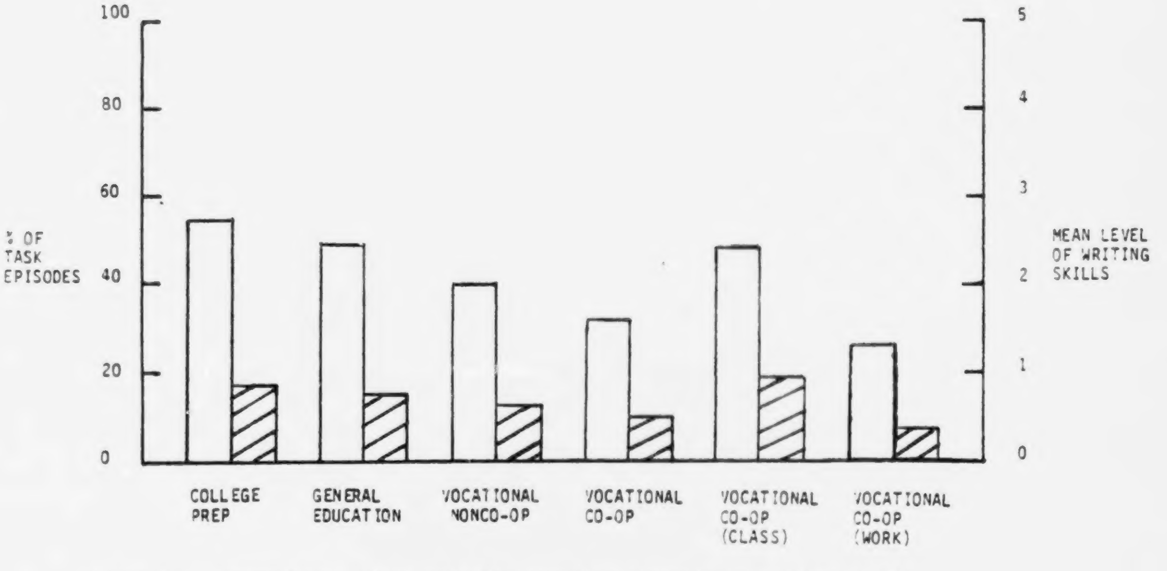

Figure C-6. Percentage of task episodes exposing students to writing skills and mean level of writing skill observed by school program.

the basic skill observed, a series of one-way analyses of variance were carried out, once again with the basic skills as the dependent variable. Subsequently, Tukey tests were performed for each basic skill to determine which programs differed reliably from one another in terms of the mean level of the basic skill. (For ease of presentation in the tables, the four school programs, i.e., college preparatory, general education, vocational nonco-op, and vocational co-op will be designated as P_1, P_2, P_3, and P_4, respectively. The vocational co-op classroom setting and the vocational co-op work site setting are subsets of P_4, and will be designated as P_5 and P_6, respectively).

The results of these analyses are presented in table C-8. Alpha levels of significance corresponding to $\underline{p} \leq .05$, .01, and .0001 are indicated by X_1, X_2, and X_3, respectively. An examination of this table permits a statistical determination of whether or not the differences in the observed frequencies and/or means of the task episodes result from exposure to a particular program or setting. Contrasts between programs can provide additional information on those learning environments that differ significantly from one another in terms of exposure to basic skills.

Identification of Specific Skills

Language skills (figure C-1) were identified when the task episode required students to read, write, and speak at some observable level. As such, it is a more global measure of language demands made on the student than its three individual

TABLE C-8

EFFECTS OF PROGRAM AND SETTING ON EXPOSURE TO BASIC SKILLS FACTORS

	Chi Square*		Analysis of Variance**		Tukey Tests (Contrasts)												
Basic Skills	School Program (P_1, P_2, P_3, P_4)	School Program and Work Site ($P1$, $P2$, $P3$, $P5$, $P6$)	School Program (P_1, P_2, P_3, P_4)	School Program and Work Site ($P1$, $P2$, $P3$, $P5$, $P6$)	P_1 vs. P_2	P_1 vs. P_3	P_1 vs. P_4	P_1 vs. P_5	P_1 vs. P_6	P_2 vs. P_3	P_2 vs. P_4	P_2 vs. P_5	P_2 vs. P_6	P_3 vs. P_4	P_3 vs. P_5	P_3 vs. P_6	P_5 vs. P_6
Language			X_3	X_3	X_1	X_1	X_1	X_1	X_1				X_1			X_1	X_1
Reading	X_3	X_3	X_3	X_3	X_1	X_1	X_1		X_1		X_1		X_1	X_1		X_1	X_1
Mathematical	X_3	X_3	X_2	X_3	X_1		X_1	X_1	X_1						X_1		X_1
Speaking	X_2	X_3	X_3	X_3			X_1		X_1		X_1		X_1	X_1		X_1	X_1
Reasoning		X_3	X_3	X_3	X_1	X_1	X_1	X_1	X_1		X_1	X_1		X_1	X_1	X_1	X_1
Writing	X_3	X_3	X_3	X_3		X_1	X_1		X_1		X_1				X_1		X_1

KEY:

$X_1 \leq .05$
$X_2 \leq .01$
$X_3 \leq .0001$

P_1 = College preparatory
P_2 = General education
P_3 = Vocational nonco-op
P_4 = Vocational co-op
P_5 = Vocational co-op classroom
P_6 = Vocational co-op work site

*Exposure to basic skill
**Mean level of the skill observed

components, reading, speaking, and writing, which were also measured. There was no significant effect of program or setting in terms of frequency of exposure to language skills, although the percentage of task episodes requiring such skills ranged from 92 percent in the college preparatory classroom to 85 percent for the vocational nonco-op classroom. There were, however, significant differences among the programs in terms of the level of language skill required. The college preparatory program required significantly higher levels of language usage than did the other programs. All classroom programs, including the vocational co-op classroom, required significantly higher levels of language skills

Reading skills (figure C-2) were identified when students were required to read materials ranging from simple instructions to complex sources of information in order to complete a task. There were significant differences among the four programs in terms of the percentage of task episodes requiring some level of reading. In general, the college preparatory program required the highest frequency of reading (72 percent of all task episodes) and the vocational co-op program required the lowest (55 percent).
and the vocational co-op program required the lowest (55 percent).
However, the low frequency of task episodes requiring reading in the latter program seems to be primarily a function of the low demand for the use of reading in work site task episodes (50 percent). Vocational co-op classes actually required a higher frequency of reading in observed task episodes than did either general education or vocational nonco-op settings (68 percent versus 67 percent versus 64 percent, respectively).

There were also significant differences among the programs and settings in terms of the level of reading skills required. College preparatory and vocational co-op classroom settings required the highest levels of reading skill usage and were not significantly different from one another. General education and vocational nonco-op programs were significantly lower in terms of reading skill usage than the college preparatory program, but were not significantly different from the vocational co-op classroom setting. The level of reading skill observed in the vocational co-op work site setting was significantly lower than all the other programs and settings.

Math skills (figure C-3) were identified when the task episode required students to deal with mathematical problems and operations ranging from counting and simple addition to higher math. There was a significant effect of school program and setting in terms of frequency of exposure to math skills. We observed a higher frequency of exposure to math in the vocational co-op program (52 percent of task episodes) and vocational nonco-op program (48 percent) than in the college preparatory and general education programs (27 percent and 24 percent, respectively). For the vocational co-op program, a higher frequency of exposure to math was observed in the work site (58 percent of task episodes) than in the classroom (34 percent).

There were also significant differences among the programs and settings in terms of the mean level of math skills observed. The college preparatory and vocational co-op programs required the highest levels of math skill usage and were not significantly different from one another. However, only the college preparatory program required significantly higher levels of math skill usage than the other two programs. The general education and vocational co-op classroom settings required the lowest levels of math skill usage and were not significantly different from one another. The higher level of math skill usage required of vocational co-op students on the work site as opposed to the classroom was statistically significant.

Speaking skills (figure C-4) were identified when the task episode required the student to produce speech ranging from simple sentences to sophisticated presentations. There was a significant effect of school program and setting in terms of frequency of exposure to speaking skills. The highest frequency of exposure to speaking skills occurred in the vocational co-op program (61 percent of task episodes), although the frequency was much greater in the work site setting (69 percent) than in the classroom setting (41 percent). The vocational nonco-op program produced higher frequencies of exposure to speaking skills (52 percent of task episodes) than did either the college preparatory or general education programs (49 percent and 50 percent, respectively).

The significant differences obtained among the mean levels of observed speaking skill usage indicate that the vocational co-op program required significantly higher levels of usage than any of the other programs. When the vocational co-op program was partitioned into its work site and classroom components, and the data were reanalyzed, the work site setting was observed to require higher levels of speaking skill usage than did any of the other programs and settings, which did not differ significantly from one another.

Reasoning skills (figure C-5) were identified when the task episode required the student to deal with situations varying in complexity on a number of dimensions such as theory versus practice, abstract versus concrete situations, and many versus few variables. There was a significant effect of school program and setting in terms of frequency of exposure to reasoning skills, but only when the vocational co-op program was partitioned into its component settings of classroom and work site. Reasoning occurred with the highest frequency in the vocational co-op work site setting (99 percent of task episodes); it occurred with the lowest frequency in the vocational co-op classroom setting (90 percent). The three remaining programs differed very slightly in terms of the frequency with which reasoning was observed, although vocational nonco-op showed a higher frequency (96 percent) than did either the college preparatory or general education programs (95 percent and 92 percent, respectively).

Significant differences among the mean levels of reasoning skill usage required by the different programs and settings were also obtained. The college preparatory program required significantly higher reasoning skill usage than did any of the other programs or settings. The general education and vocational nonco-op programs were not significantly higher in terms of reasoning skill usage than either the classroom or work site settings in the vocational co-op program. The latter two settings did not differ significantly from one another.

Writing skills (figure C-6) were identified when the task episode required the student to write or print written matter varying in complexity from simple sentences to plays or novels. There was a significant effect of school program and setting in terms of frequency of exposure to writing skills. The highest levels of exposure occurred in the college preparatory program (55 percent of task episodes), and the lowest level occurred for the vocational co-op program (32 percent). A wide discrepancy existed between the settings for the vocational co-op program, however. Whereas writing was observed in only 26 percent of the work site task episodes, that frequency increased to 48 percent in the classroom. Writing skills were observed in 49 percent of the task episodes in the general education program, and 40 percent of the task episodes in the vocational nonco-op program.

Significant differences among the mean levels of writing skill usage required were also obtained. The vocational co-op classroom setting required the highest mean level of writing skill usage, but the level observed was not significantly greater than that observed in the college preparatory and general education programs. The vocational co-op work site setting required the lowest mean level of writing skill usage, but the level observed was not significantly lower than that observed for the vocational nonco-op program. The mean level of writing skill usage required by the latter two programs was, however, significantly lower than that required by the former three.

In summarizing the results of the observations on the basic skills data, one finds a complex interaction between school program and setting in terms of the particular skill observed. No single program can be said to be superior to the others in terms of the demand for or exposure to levels of all basic skills. As might reasonably be expected, the college preparatory program compares quite favorably with the others in terms of the frequency of exposure to basic skills and the level of usage of those skills that is actually demonstrated by the students. This is particularly true in terms of reading skill. The college preparatory program produced the highest frequency of task episodes in which some level of reading was observed and the highest level of mean skill usage.

In other instances, the differences between the programs are not so clear cut. In terms of language skills, for instance, although college preparatory students perform at the highest mean level of skill usage and vocational co-op work site students at the lowest, there is no significant difference between any of the programs or settings in terms of frequency of exposure to some level of this variable.

In two instances (math and speaking skills), vocational programs demonstrated a higher frequency of exposure than did the more academically oriented programs. Although the level of math used by vocational students was, on the average, lower than that observed in the academic programs, the level of speaking and writing skill usage was either superior to or at least equivalent to that observed in the college preparatory and general education programs.

A final point regards the relationship between the settings in which vocational co-op students were observed. In two instances (reading and writing skills), the classroom setting demonstrated a clear superiority over the work site both in terms of frequency of exposure to the skill and the average level of skill usage observed. In two other instances (math and speaking skills), the situation was exactly the opposite with the work site demonstrating a clear advantage. What can one conclude about the effect of work site experience on exposure to basic skills? It seems clear that the presence or absence of a particular basic skill, as well as the level with which it is exercised, should be largely determined by the particular work situation in which a student is involved. Our results clearly indicate an advantage for the work site over the classroom in terms of exposure to and proficiency in certain skills, and a disadvantage for others. This does not indicate that the work site should be counted on to provide vocational students with basic skills proficiency and that the school should be ignored. However, these results may indicate those areas in which school programs need to be strengthened, as well as situations in which a judicious use of the work site as an educational environment might benefit the student.

Relationships between Attentional Factors and Programs and Settings

Six attentional factors were included in the observation methodology in an attempt to assess students' level of cognitive involvement with data, people, and things. The individual attentional variables are divided into the following two global categories:

- Data, people, and things function variables, which indicate the level of involvement displayed by a student with regard to the three separate foci of attention, and
- Data, people, and things orientation variables, which assess the relative percentage of a student's involvement with each of the individual variables in contrast to the other two.

Tables C-9 and C-10 display the distribution of task episodes in which students were exposed to the attentional factors, and the mean level of the attentional factor observed, respectively. These tabular results are graphically displayed in figures C-7 through C-12. Results of the chi square, analysis of variance, and Tukey comparison tests are presented in table C-11.

Observed Patterns for Each Attentional Factor

The attentional factor of data function (figure C-7) was defined as the level of information, ideas, and facts used by the student. This variable ranged in ascending degree of complexity from simple comparing, selecting, and sorting operations to more advanced innovation, coordination, and synthesizing activities.

There were no significant differences among the school programs or settings in terms of frequency of exposure to data

TABLE C-9

PERCENTAGE OF TASK EPISODES (BY PROGRAM AND SETTING) EXPOSING STUDENTS TO ATTENTIONAL MEASURES

Program/ Setting	Attentional Measures					
	Data Function %	People Function %	Things Function %	Data Orient. %	People Orient. %	Things Orient. %
College prep. N = 203	93	89	85	93	89	88
General education N = 192	89	85	76	91	89	80
Voc. ed. noncooperative N = 263	91	90	88	89	83	91
Voc. ed. cooperative N = 700	91	83	89	89	77	91
Voc. ed. noncooperative classroom N = 183	89	71	78	92	68	85
Voc. ed. noncooperative work site N = 517	91	87	93	88	80	93

TABLE C-10

MEANS ($\bar{X}$) AND STANDARD DEVIATIONS (STD) OF TASK EPISODES (BY PROGRAM AND SETTING) EXPOSING STUDENTS TO ATTENTIONAL MEASURES

Program/ Setting	Attentional Measures					
	Data Function %	People Function %	Things Function %	Data Orient. %	People Orient. %	Things Orient. %
College prep. N = 203	2.64 (1.24)	1.30 (.70)	.86 (.38)	50.81 (22.13)	32.63 (22.31)	16.43 (18.22)
General education N = 192	2.22 (1.29)	1.20 (.69)	.77 (.45)	50.76 (23.35)	31.95 (25.07)	17.40 (18.84)
Voc. ed. noncooperative N = 263	2.21 (1.21)	1.33 (.71)	1.35 (.74)	40.40 (21.71)	25.42 (21.53)	34.33 (21.86)
Voc. ed. cooperative N = 700	1.67 (1.00)	1.35 (.81)	1.29 (.65)	37.05 (20.89)	27.02 (24.84)	35.94 (22.01)
Voc. ed. cooperative classroom N = 183	1.89 (1.13)	.97 (.76)	1.16 (.77)	45.27 (21.13)	23.17 (25.81)	31.58 (23.80)
Voc. ed. cooperative work site N = 517	1.60 (.94)	1.48 (.78)	1.34 (.60)	34.14 (20.03)	28.38 (24.44)	37.48 (21.16)

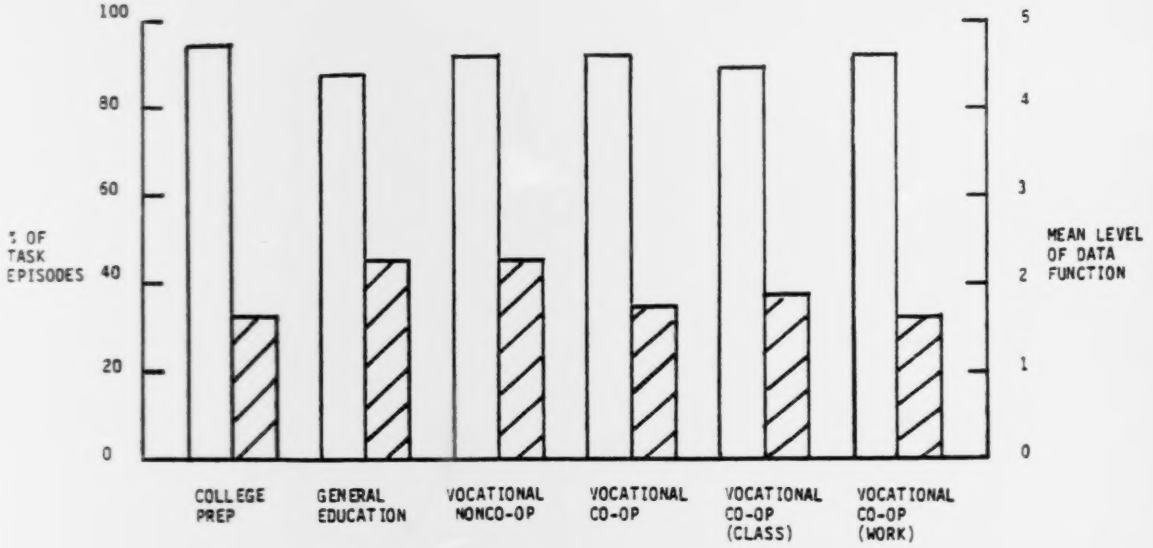

Figure C-7. Percentage of task episodes exposing students to data function and mean level of data function by school program.

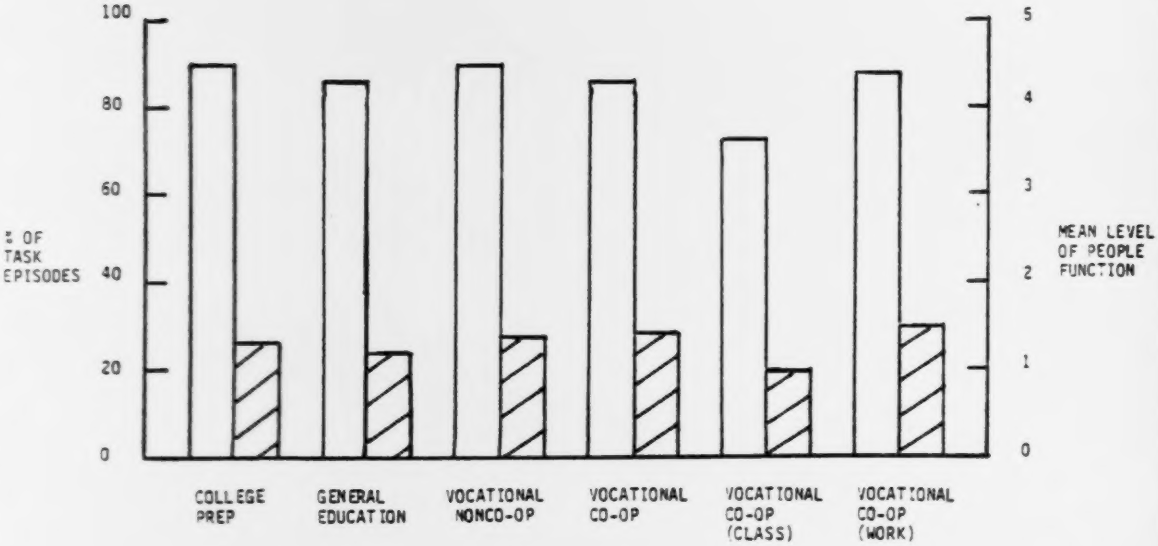

Figure C-8. Percentage of task episodes exposing students to people function and mean level of people function by school program.

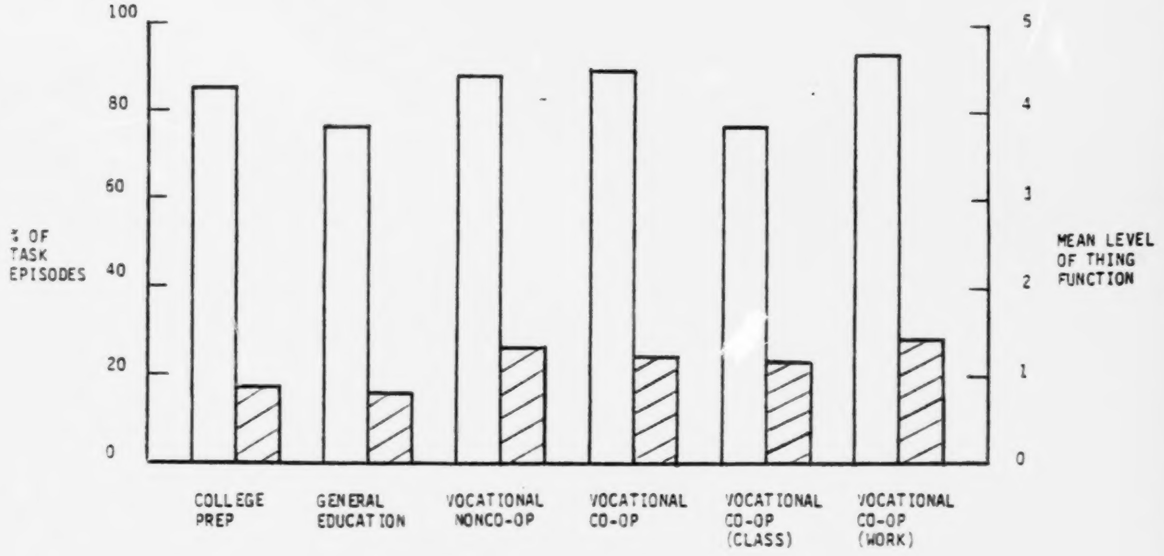

Figure C-9. Percentage of task episodes exposing students to thing function and mean level of thing function by school program.

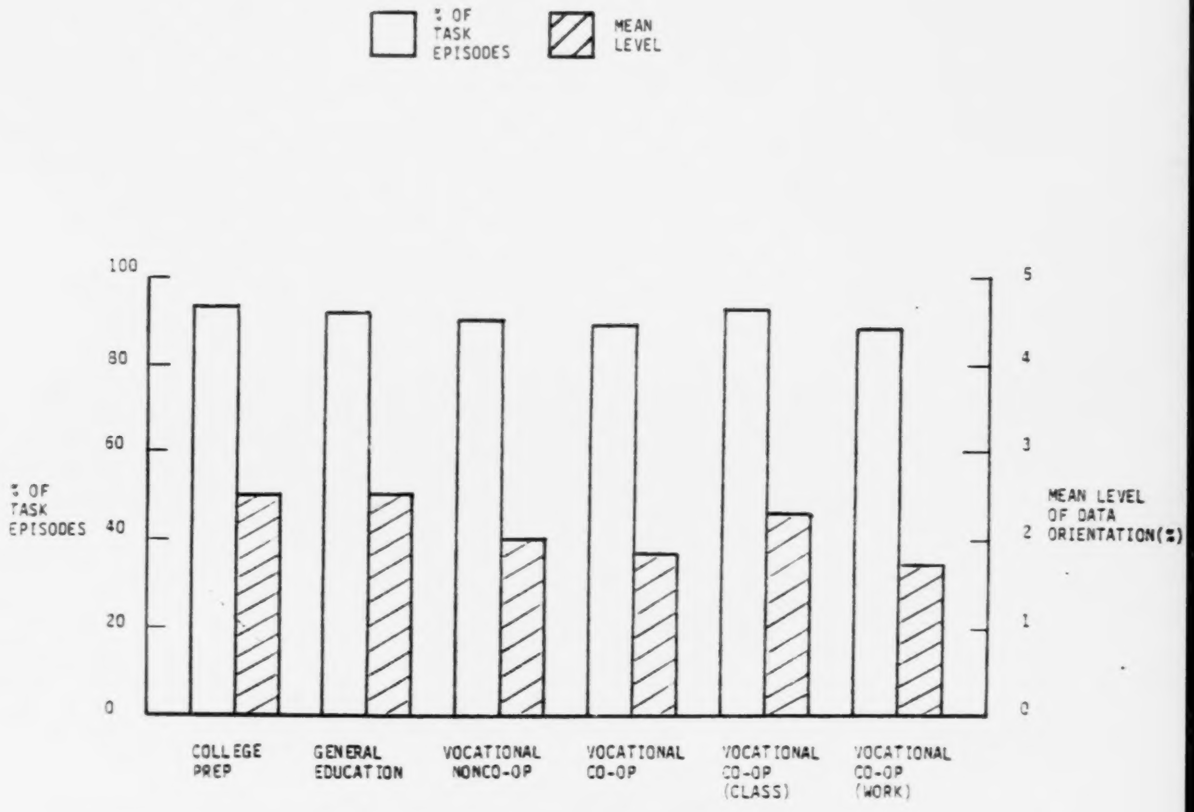

Figure C-10. Percentage of task episodes exposing students to data orientation and mean level of data orientation by school program.

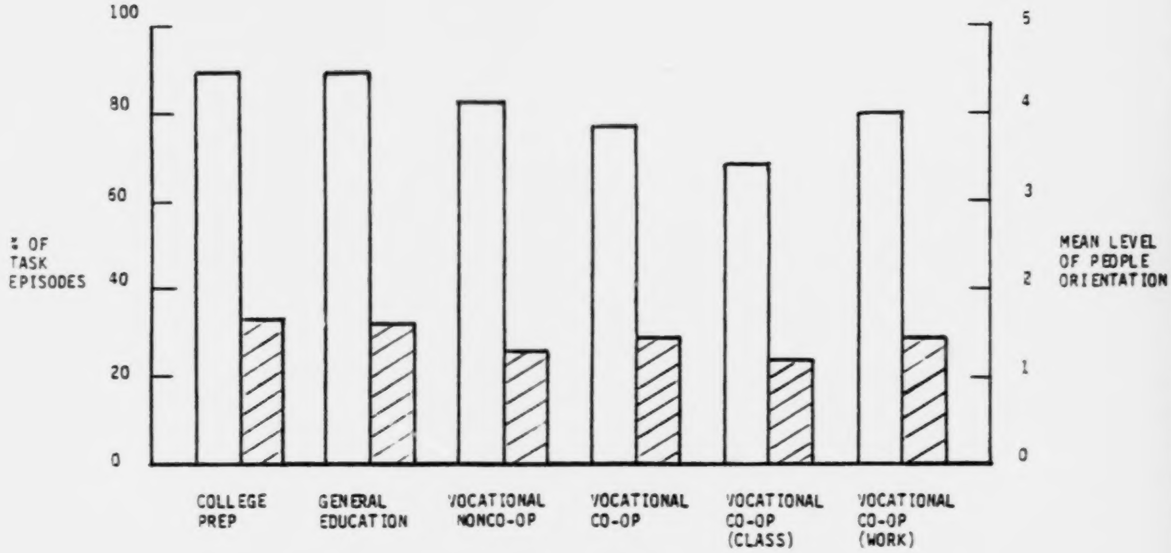

Figure C-11. Percentage of task episodes exposing students to people orientation and mean level of people orientation by school program.

☐ % OF TASK EPISODES ▨ MEAN LEVEL

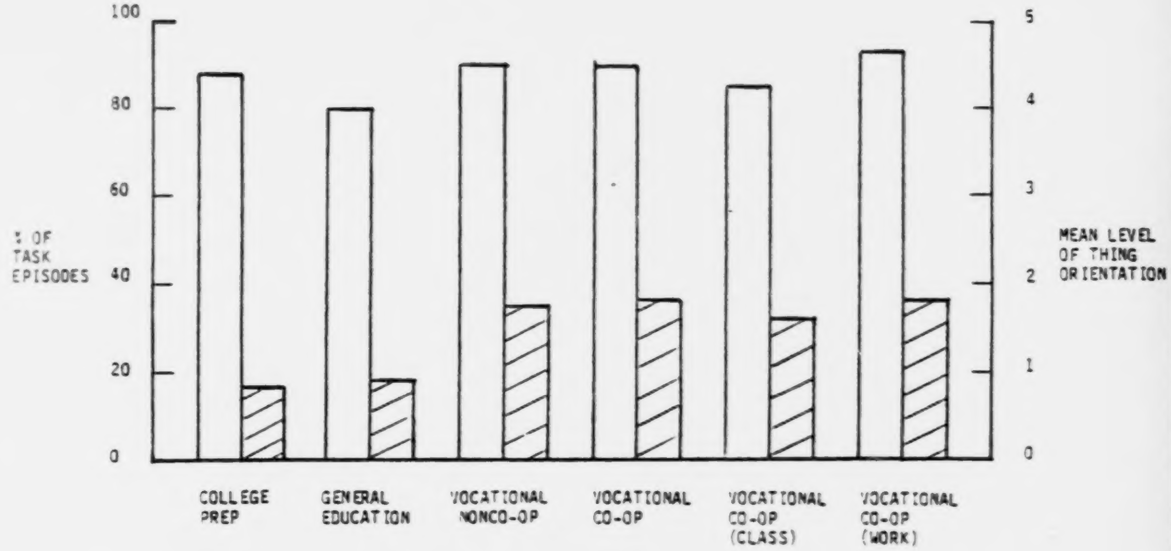

Figure C-12. Percentage of task episodes exposing students to thing orientation and mean level of thing orientation by school program.

TABLE C-11

EFFECTS OF PROGRAM AND SETTING ON EXPOSURE TO ATTENTIONAL FACTORS

	Chi Square*		Analysis of Variance**		Tukey Tests (Contrasts)												
Attentional Factors	School Program (P_1, P_2, P_3, P_4)	School Program and Work Site (P_1, P_2, P_3, P_5, P_6)	School Program (P_1, P_2, P_3, P_4)	School Program and Work Site (P_1, P_2, P_3, P_5, P_6)	P_1 vs. P_2	P_1 vs. P_3	P_1 vs. P_4	P_1 vs. P_5	P_1 vs. P_6	P_2 vs. P_3	P_2 vs. P_4	P_2 vs. P_5	P_2 vs. P_6	P_3 vs. P_4	P_3 vs. P_5	P_3 vs. P_6	P_5 vs. P_6
Data function			X_3	X_3	X_1	X_1	X_1	X_1	X_1		X_1	X_1	X_1	X_1	X_1	X_1	X_1
People function	X_2	X_3		X_3				X_1	X_1			X_1	X_1		X_1		X_1
Things function	X_3	X_3	X_3	X_3		X_1	X_1	X_1	X_1	X_1	X_1	X_1	X_1		X_1		X_1
Data orientation			X_2	X_3		X_1	X_1	X_1	X_1	X_1	X_1	X_1	X_1			X_1	X_1
People orientation			X_3	X_3		X_1	X_1	X_1		X_1		X_1					
Things orientation	X_3	X_3	X_3	X_3		X_1	X_1	X_1	X_1	X_1	X_1	X_1	X_1				X_1

KEY:

$X_1 \leq .05$
$X_2 \leq .01$
$X_3 \leq .0001$

P_1 = College preparatory
P_2 = General education
P_3 = Vocational nonco-op
P_4 = Vocational co-op
P_5 = Vocational co-op classroom
P_6 = Vocational co-op work site

*Exposure to basic skill
**Mean level of the skill observed

function. In all programs and settings, some level of data function was present in approximately 90 percent of the task episodes. The college preparatory program showed the highest frequency of occurrence (93 percent of task episodes), and the general education program showed the lowest frequency (89 percent).

Significant differences among programs and settings in terms of the mean level of data function observed were obtained. The college preparatory program was significantly higher on this factor than were the other three programs. The general education and vocational nonco-op programs were not significantly different from one another, but both ranked significantly higher on data function than did the vocational co-op program. When the latter program was partitioned into its classroom and work site settings, the work site setting ranked significantly lower than did the classroom setting on mean level of data function observed. The vocational co-op classroom remained significantly lower than the other three classroom based programs.

The attentional factor of people function (figure C-8) was defined as the level of the student's interaction with other students, co-workers, teachers, or supervisors. This variable ranged in ascending level of complexity from simply taking instructions (with very little verbal exchange required) to advising, counseling, or offering guidance to other individuals.

There were significant differences among the school programs and settings in terms of the frequency of exposure to some level of people function. When the four programs were analyzed, the vocational nonco-op program showed the highest frequency of exposure to people function (90 percent of task episodes), and the vocational co-op program showed the lowest (83 percent). The college preparatory and general education programs showed intermediate frequencies (89 percent and 85 percent, respectively). When the vocational co-op data was partitioned into its work site and classroom settings and the data were reanalyzed, the vocational co-op classroom showed the lowest frequency of exposure to people function (71 percent of task episodes); the work site resulted in a level (87 percent) in between that observed in the college preparatory and general education classroom settings.

Significant differences among programs and settings in terms of the mean level of people function observed were also obtained, but only when the vocational co-op program was partitioned into its two component settings. The vocational co-op work site setting showed the highest mean level of people function, although it was not significantly higher than the vocational nonco-op or college preparatory classroom settings. On the other hand, the vocational co-op classroom setting showed a mean level of people function that was significantly lower than that observed for any other setting.

The attentional factor of things function (figure C-9) was defined as the level of the students' interaction with objects (e.g., typewriters, cash registers, and drafting tools). This variable ranged in ascending level of complexity from simple handling of materials that require no significant set-up and have highly prescribed adjustments and/or uses, to comparatively complex precision working situations requiring elaborate set-up and maintenance procedures.

There were significant differences among the school programs and settings in terms of the frequency of exposure to some level of thing function. The vocational co-op program showed the highest frequency of exposure (89 percent of task episodes), and the general education program showed the lowest (76 percent). The vocational nonco-op and college preparatory programs showed intermediate frequencies (88 percent and 85 percent, respectively). When the vocational co-op program was partitioned into its work site and classroom settings, the vocational co-op work site setting showed the highest frequency of all settings in terms of exposure to thing function (93 percent of task episodes); the vocational co-op classroom setting showed a considerably lower frequency (78 percent).

Significant differences among programs and settings in terms of the mean level of thing function observed were also obtained. The vocational nonco-op program showed the highest mean level of thing function, although it was not significantly higher than the vocational co-op program. Both of these were significantly higher than the college preparatory and general education programs, the latter two not showing any statistically significant differences between them. When the vocational co-op program was partitioned into its classroom and work site settings, a somewhat different result was observed. Once again, the vocational nonco-op setting showed the highest level of thing function, but was not significantly higher than the vocational co-op work site setting. The vocational co-op classroom setting showed a level of things function significantly lower than that obtained for the above two settings, but significantly higher than that obtained for either the college preparatory or general education classroom settings.

Data orientation (figure C-10) was defined as the percentage of the student's involvement with data in contrast to people and things. All orientation variables were scored in terms of percentages. Increasing percentage values for a particular orientation variable reflect greater orientation to that variable in relation to the other two. There were no significant differences between the school programs or settings in terms of frequency of exposure to data orientation. On the average, 90 percent of all task episodes involved exposure to this variable, and although the college preparatory program showed the highest frequency of exposure (93 percent of task episodes), it did not significantly differ from the general education program (91 percent), the vocational nonco-op program (89 percent), or the vocational co-op program (89 percent). There was a slightly higher frequency of exposure to data orientation in the vocational co-op classroom (92 percent of task episodes) as opposed to the work site (88 percent), but this difference was not statistically significant.

There were significant differences among the school programs and settings in terms of the mean level of data orientation observed. The college preparatory and general education programs did not significantly differ from one another, although both were significantly higher in terms of mean value of data function than either the vocational nonco-op or vocational co-op programs. The latter two programs did not differ significantly from one another. When the vocational co-op program was partitioned into its classroom and work site components, a slightly different result emerged. Once again, the college preparatory and general education classroom settings showed a significantly higher mean level of exposure to data orientation than did the other settings, although the two settings were not significantly different from one another. However, the vocational co-op work site setting showed a significantly lower level of exposure to this factor than did any of the other programs. The vocational co-op and vocational nonco-op classroom settings did not significantly differ from one another and showed mean levels of data function that were intermediate to those of the programs discussed above.

People orientation (figure C-11) was defined as the percentage of the student's involvement with people in contrast to data and things. Significant differences among the programs and settings were observed in terms of frequency of exposure to this factor. The general education and college preparatory programs showed the highest frequency of exposure to people orientation (89 percent of task episodes); the vocational nonco-op (83 percent) and vocational co-op (77 percent) programs showed the lowest frequency. The vocational co-op work site setting showed a higher frequency of exposure to people orientation (80 percent of task episodes) than did the vocational co-op classroom setting (68 percent).

The significant differences obtained among the programs and settings in terms of the mean level of observed people orientation, revealed a somewhat complex set of results. The college preparatory program showed the highest mean level of people orientation, although it was not significantly higher than that observed for the general education program. The college preparatory program was, however, significantly higher than the vocational co-op program, whereas the general education program was not. In a similar fashion, the general education program showed a significantly higher level of people orientation than did the vocational nonco-op program, although the latter was not significantly lower than the vocational co-op program.

The situation becomes a little clearer when the vocational co-op program is partitioned into its classroom and work site settings. The college preparatory and general education classroom settings were significantly higher in terms of the mean level of people orientation observed than were either the vocational nonco-op or vocational co-op classroom settings, but not significantly different from the vocational co-op work site setting. The latter setting was itself, however, not significantly higher in terms of people orientation than was the vocational co-op classroom setting.

Things orientation (figure C-12) was defined as the percentage of the student's involvement with things in contrast to data and people. There were significant differences observed among the school programs and settings in terms of frequency of exposure to this factor. The vocational co-op and nonco-op programs showed the highest frequency of occurrence (91 percent of task episodes); the college preparatory (88 percent) and general education (80 percent) programs showed the lowest. Partitioning the vocational co-op program into its classroom and work site settings revealed a higher frequency of exposure to thing orientation in the work site (93 percent of task episodes) than in the classroom (85 percent).

There were also significant differences among the settings and programs in terms of the mean level of things orientation observed. The vocational co-op program showed the highest mean level, although it was not significantly higher than was the vocational nonco-op program. These latter two programs were both significantly higher on mean level of thing orientation than either the college preparatory or general education programs. These latter two programs were not significantly different from one another on this factor.

Partitioning the vocational co-op program into its classroom and work site settings produced a somewhat different ranking on things orientation. The vocational co-op work site setting showed the highest mean level of thing orientation, although it was not significantly higher than the vocational nonco-op classroom setting. The vocational co-op classroom setting showed a lower mean level of things orientation than did the vocational nonco-op work site setting, but the difference was not statistically significant. The college preparatory and general education classroom settings were significantly lower than all the other settings, but did not differ significantly from one another.

Summary

In summarizing the results of the attentional variables, it seems to make sense to unite the function and orientation categories and discuss data, people, and things as separate dimensions of attention in relation to their occurrence in the various programs and settings.

First of all, the finding of no significant difference among any of the programs in terms of frequency of exposure to either of the data measures, indicated that exposure to data at some level is evenly distributed across programs and settings. However, systematic differences among settings in terms of the mean levels of both factors were observed.

The college preparatory classroom showed the highest mean levels of data function and data orientation; in both cases the vocational co-op work site setting showed the lowest. There is perhaps little that is surprising in this result since greater demands would be placed on college preparatory students in terms of the level of information, ideas, and facts employed. However, the fact that the vocational co-op work site setting required very low demands in terms of data indicates that the type of work involved was not heavily oriented toward abstract or cognitive tasks, and that the observed deficit in the work site has to be made up in the vocational co-op classroom. Our results indicate that particularly in the case of the level of information, ideas, and facts required, this deficit is not being offset. Although the vocational co-op classroom made greater data demands on students than the vocational co-op work site, it nevertheless lagged far behind the other classroom settings.

In terms of the attentional measures related to people, the trend is somewhat less clear. The vocational co-op classroom ranked lowest in terms of frequency of exposure to and mean level of both people function and orientation. This finding indicates a deficiency in this regard that is even more pronounced than that observed with the data variables. The vocational nonco-op classrooms showing the greatest frequency of exposure to people function indicate a greater _amount_ of interpersonal interaction in that setting as opposed to the others. The highest _level_ of people function was observed in the vocational co-op work site, however, indicating that a more sophisticated degree of personal interaction existed in the workplace than in the scholastic environment. In terms of the people orientation measure, or the relative percentage of involvement with people as opposed to data or things, the college preparatory and general education classroom settings showed the highest frequency _and_ mean level. The vocational co-op work site was not significantly different from these two, however, in terms of the level of people orientation observed. It seems, therefore, that the quality of personal interaction observed in the work site may serve to offset at least partially the deficits observed in the vocational co-op classroom on this factor.

Finally, in terms of attentional measures related to things, the vocational co-op work site setting demonstrated both a higher frequency of exposure to, and a higher mean level required of, both the function and orientation factors. The college preparatory and general education programs were generally lowest on all measures relevant to these factors. One surprising finding, however, was the fact that the frequency of things orientation in the vocational co-op classroom (85 percent) was lower than that of the college preparatory classroom (88 percent).

In general, the findings of the observation data in terms of the attentional factors seem to offer support for the idea that work site experience may be of great value to all students--and particularly to vocational students. While the nature of some of the jobs in the sample may have been such that attention to data is minimized at the work site, this phenomenon seems to have been at least partially offset by an advantage in terms of people and thing attentional measures.

Relationships between Environmental Factors and Programs and Settings

The intent of this area of the study is to examine the patterns of environmental factors related to programs and settings. In other words, do the programs and settings exhibit different patterns of exposure to, and level required of, environmental factors?

The environmental factors listed in table C-3 represent a more heterogeneous array than that observed in the preceding two sections. In the first place, there are "task episode" variables and "summary observation" variables. Task episode variables are similar to those factors discussed in the previous two sections in that they were scored by the observers for each task episode in each observation. The summary observation variables, however, were scored only once per observation and will therefore be discussed in terms of frequency of observations present rather than frequency of task episodes. Finally, factors marked with asterisks in table C-12 signify that the levels of these variables were nominal in nature, and that analyses of variance and Tukey tests were therefore not carried out. Discussion of these variables will be restricted to the frequency of occurrence of the various levels. Tables C-13 and C-14 display the distribution of task episodes and observations in which students were exposed to environmental factors, and the mean level of the environmental factor observed, respectively.

The environmental factors will be discussed in the following order:

- Number of major task episode categories by school program and setting
- Task episode environmental variables by school program and setting
- Summary observation environmental variables by school program and setting.

Observed Patterns for Each Environmental Factor

Major task episode categories (figure C-13) were obtained in each observation by classifying individual task episodes into common groups. For instance, if a classroom observation consisted of task episodes of writing interrupted by several task episodes of taking directions, there would be two major task episode

TABLE C-12

EFFECTS OF PROGRAM AND SETTING ON EXPOSURE TO ENVIRONMENTAL FACTORS

	Chi Square*		Analysis of Variance**		Tukey Tests (Contrasts)												
ENVIRONMENTAL FACTORS	School Program (P_1, P_2, P_3, P_4)	School Program and Work Site (P_1, P_2, P_3, P_5, P_6)	School Program (P_1, P_2, P_3, P_4)	School Program and Work Site (P_1, P_2, P_3, P_5, P_6)	P_1 vs. P_2	P_1 vs. P_3	P_1 vs. P_4	P_1 vs. P_5	P_1 vs. P_6	P_2 vs. P_3	P_2 vs. P_4	P_2 vs. P_5	P_2 vs. P_6	P_3 vs. P_4	P_3 vs. P_5	P_3 vs. P_6	P_5 vs. P_6
Number of major task episode categories			X_3	X_3			X_1		X_1		X_1		X_1	X_1		X_1	X_1
Articulation***	X_3	X_3															
Autonomy	X_3	X_3	X_3	X_3		X_1	X_1	X_1	X_1	X_1	X_1	X_1	X_1				
Coordination			X_2	X_3					X_1		X_1		X_1			X_1	X_1
Importance			X_3	X_3			X_1		X_1	X_1	X_1	X_1	X_1	X_1		X_1	X_1
Initiation***	X_2	X_2															
Instruction			X_2	X_2			X_1		X_1								
Feedback		X_2	X_2	X_2			X_1	X_1									
Simultaneity				X_2				X_1				X_1			X_1		X_1
Split task	X_3	X_3	X_3	X_3			X_1		X_1		X_1		X_1	X_1	X_1	X_1	X_1
Support***																	

KEY:

$X_1 < .05$
$X_2 < .01$
$X_3 < .0001$

P_1 = College preparatory
P_2 = General education
P_3 = Vocational nonco-op
P_4 = Vocational co-op
P_5 = Vocational co-op classroom
P_6 = Vocational co-op work site

*Exposure to basic skill
**Mean level of the skill observed
***Indicates that levels of variable are nominal in nature. Analyses of variance and Tukey comparison tests were therefore not performed.

TABLE C-13

PERCENTAGE OF TASK EPISODES (BY PROGRAM AND SETTING) EXPOSING STUDENTS TO ENVIRONMENTAL FACTORS

Program/ Setting	Environmental Factors Exposure										
	Articulation %	Autonomy %	Coordination %	Feedback %	Importance %	Initiator %	Instruction %	Simultaneity %	Split Task %	Support %	Major Task %
College preparatory N = 203	9	97	98	56	99	100	98	0	35	99	99
General education N = 192	6	97	99	44	99	99	99	0	32	100	100
Vocational education noncooperative N = 263	13	100	100	39	99	96	100	0	33	100	100
Vocational education cooperative N = 700	27	100	100	56	99	95	100	1	19	100	100
Vocational education cooperative classroom N = 183	7	99	100	33	98	97	100	3	31	100	100
Vocational education cooperative work site N = 517	35	100	100	42	100	94	100	1	15	100	100

TABLE C-14

MEANS ($\bar{X}$) AND STANDARD DEVIATIONS (STD) OF TASK EPISODES (BY PROGRAM AND SETTING) EXPOSING STUDENTS TO ENVIRONMENTAL FACTORS

Program/ Setting	Environmental Factors Exposure										
	Articulation X (STD)	Autonomy X (STD)	Coordination X (STD)	Feedback X (STD)	Importance X (STD)	Initiator X (STD)	Instruction X (STD)	Simultaneity X (STD)	Split Task X(STD)	Support X (STD)	Major Task X(STD)
Academic/ college preparatory N = 203	1.88 (.37)	2.33 (.82)	2.15 (.64)	2.25 (1.57)	2.08 (.67)	2.34 (.97)	1.91 (.75)	.01 (.07)	1.05 (1.68)	3.20 (1.02)	2.66 (1.36)
General education N = 192	1.89 (.39)	2.28 (.81)	2.03 (.55)	1.86 (1.60)	1.94 (.43)	2.52 (.87)	1.74 (.65)	0 (0)	.91 (1.48)	3.00 (.99)	2.69 (1.45)
Vocational education noncooperative N = 263	1.83 (.43)	1.85 (.81)	3.00 (.52)	1.68 (1.52)	2.34 (.75)	1.93 (1.08)	1.70 (.60)	0 (0)	1.02 (1.71)	2.59 (.82)	3.31 (1.97)
Vocational education Cooperative N = 700	1.70 (.49)	1.91 (.78)	1.86 (.75)	1.55 (1.48)	2.71 (.84)	2.46 (1.63)	1.61 (.61)	.02 (.21)	.57 (1.38)	2.46 (.84)	4.97 (4.75)
Vocational education cooperative classroom N = 183	1.84 (.49)	1.82 (.86)	1.74 (.57)	1.40 (1.60)	2.27 (.82)	2.17 (1.00)	1.70 (.62)	.05 (.36)	1.01 (1.81)	2.80 (.92)	3.28 (1.54)
Vocational education cooperative Work Site N = 517	1.65 (.48)	1.94 (.75)	2.69 (.82)	1.70 (1.34)	3.15 (.61)	2.56 (1.79)	1.52 (.60)	.01 (.17)	.41 (1.15)	2.12 (.58)	6.65 (6.11)

categories; writing and taking directions. Since nontask episodes were not analyzed, all observations were composed entirely of major task episode categories. For this reason, frequency data were not analyzed.

However, significant differences were observed among school programs and settings in terms of the mean number of major task episode categories noted in each observation. The vocational co-op program had a significantly greater number of major task episode categories per observation (5.0) than did the other 3 programs. The vocational nonco-op (3.3 major task episode categories per observation), general education program (2.7), and college preparatory program (2.7) did not differ significantly from one another.

When the data from the vocational co-op program were partitioned into its classroom and work site components, it was observed that the work site had a significantly higher number of major task episode categories per observation (6.7) than did the other settings, none of which differed significantly from one another. More than twice as many major task episode categories were observed in the work site setting than in the vocational co-op classroom setting (3.3).

Task Episode Environmental Variables

The environmental variable articulation (figure C-14) was defined in terms of how a task episode related to other tasks performed at the organization. If other students or workers relied on the student to complete a task before beginning or

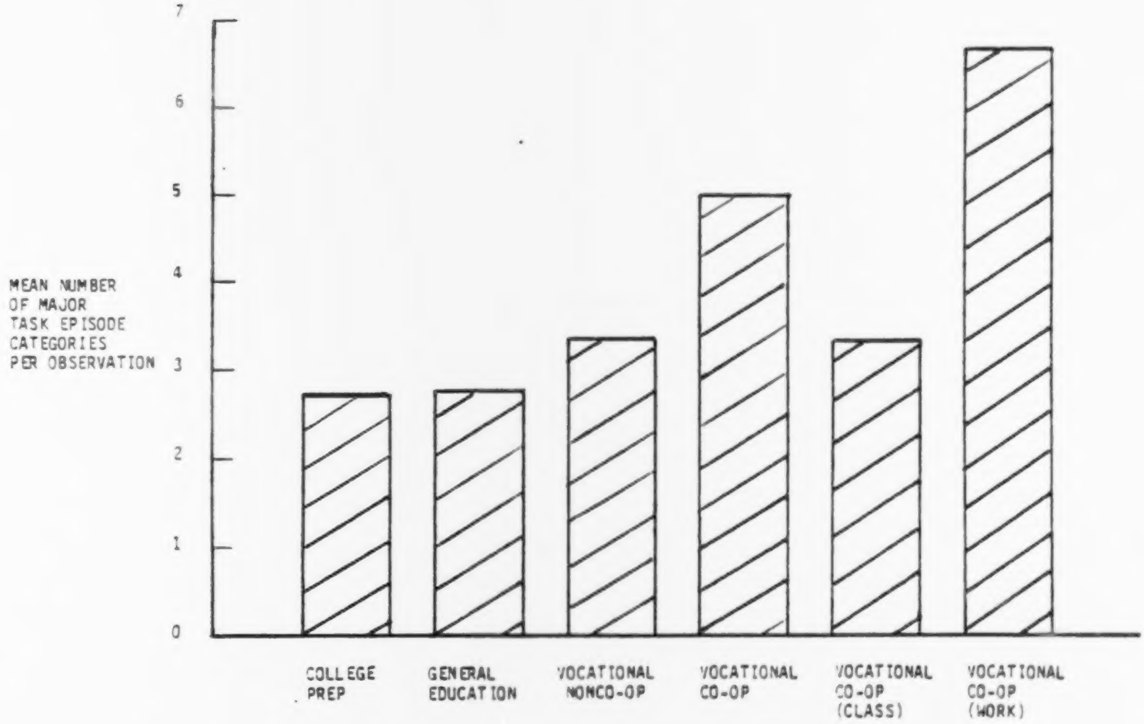

Figure C-13. Mean number of major task episodes per observation by school program

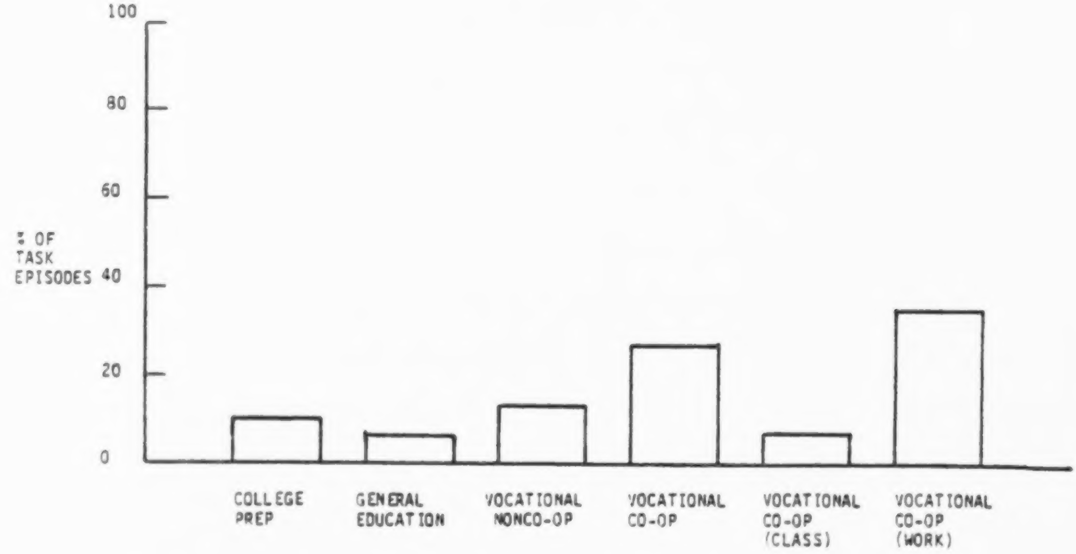

Figure C-14. Percentage of task episodes exposing students to articulation (i.e., percentage of task episodes in which other students or workers depend on student to complete a task before they can start or continue their activities).

continuing with their own, than the task episode was considered to articulated.

Significant differences among programs were observed in terms of the frequency of occurrence of articulated task episodes. The vocational co-op program showed evidence of articulation in 27 percent of the task episodes observed, whereas vocational nonco-op (13 percent), college preparatory (9 percent), and general education (6 percent) showed fewer task episodes involving articulation.

When the vocational co-op program was partitioned into its classroom and work site components, it became clear that the high degree of articulation observed in the vocational co-op program was primarily attributable to the preponderance of that factor in the work site (35 percent of task episodes) as compared to the classroom (7 percent). In fact, the vocational co-op classroom showed a rate of occurrence of articulation only marginally higher than that observed for the general education classroom (6 percent).

The environmental factor of autonomy (figure C-15) was defined as the degree of flexibility the student had in carrying out tasks. Significant differences were obtained in terms of the frequency of occurrence of autonomy. But it is the opinion of the authors that the significance of this result is spurious and results from the previously mentioned violation of the assumptions of the chi-square test in regard to this particular factor. An inspection of figure C-15 will certainly indicate to the reader that there is unlikely to be a significant difference among the

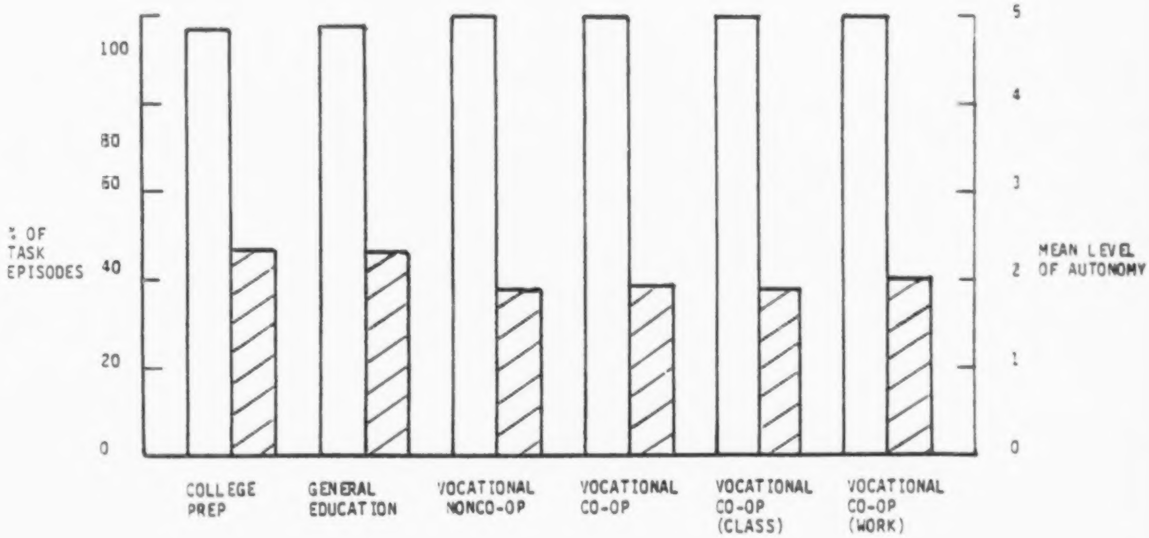

Figure C-15. Percentage of task episodes exposing students to autonomy and mean level of autonomy observed by school program.

programs and settings in terms of the frequency of occurrence of autonomy.

There were, however, significant differences among the school programs in terms of the mean level of autonomy observed. The college preparatory program showed the highest mean level of autonomy, but the level here was not significantly higher than that shown for general education. Both of these programs were significantly higher on autonomy than were the vocational co-op and nonco-op programs, which did not differ significantly from one another. Partitioning the vocational co-op program into its classroom and work site settings did not change the overall pattern of significance described above. The work site setting showed a somewhat higher mean level of autonomy than the classroom setting, but the difference was not significant.

The environmental factor of initiation (figure C-16) was defined in terms of the person who initiated a particular task episode. The results of observations on this factor will be discussed with respect to the frequency with which various individuals initiated task episodes within a given program or setting.

The results of the initiation data indicate two interesting trends. First of all, in the academic settings (college preparatory and general education classrooms) the highest rate of initiation belonged to the teacher, indicating that the teacher was the individual who determined the nature of the majority of task episodes. The opposite result appeared for the vocational programs; here the initiation was less under the control of the

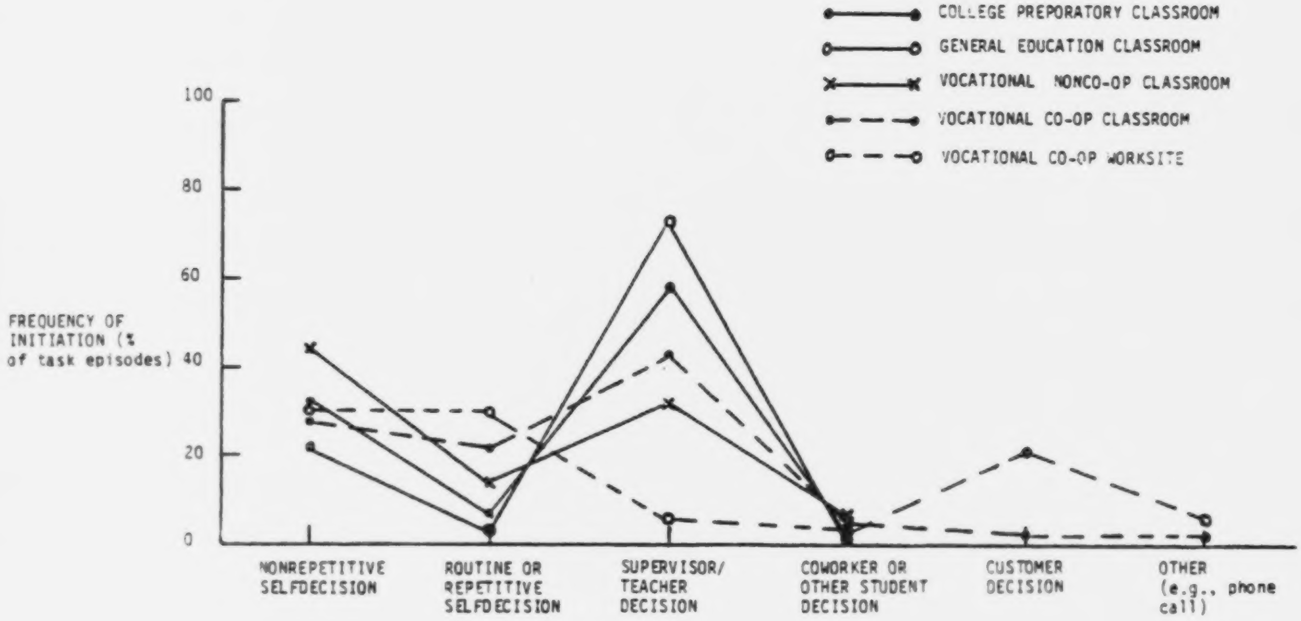

Figure C-16. Frequency of initiation of task episodes by initiator and setting teacher and more under the control of the student. The vocational nonco-op classroom showed the highest percentage of nonrepetitive self-initiated task episodes (29 percent). It is interesting to note the extremely low occurrence of supervisor-initiated task episodes in the vocational co-op work site setting (6 percent) in comparison to the other settings. These results seem to indicate that vocational co-op work site students are engaging in somewhat routine and repetitive tasks that require little supervisor intervention.

The environmental factor of simultaneity was defined as the occurrence of two or more task episodes (or parts of task episodes) at the same time. This factor, appeared very rarely in any of the task episodes was significant only when settings--not programs--were being compared. The results indicated that the vocational co-op classroom setting showed a significantly higher percentage (5 percent) of simultaneous tasks per task episode than did any of the other programs. Two of the settings (college preparatory and general education classrooms) showed no simultaneous tasks whatsoever.

The environmental factor of split tasks (figure C-17) was identified as a student's return to an interrupted task episode. The variable was recorded as the number of times each task episode was split (e.g., 0 represented an uninterrupted task episode, 1 represented a task episode that was interrupted once and subsequently completed, etc.).

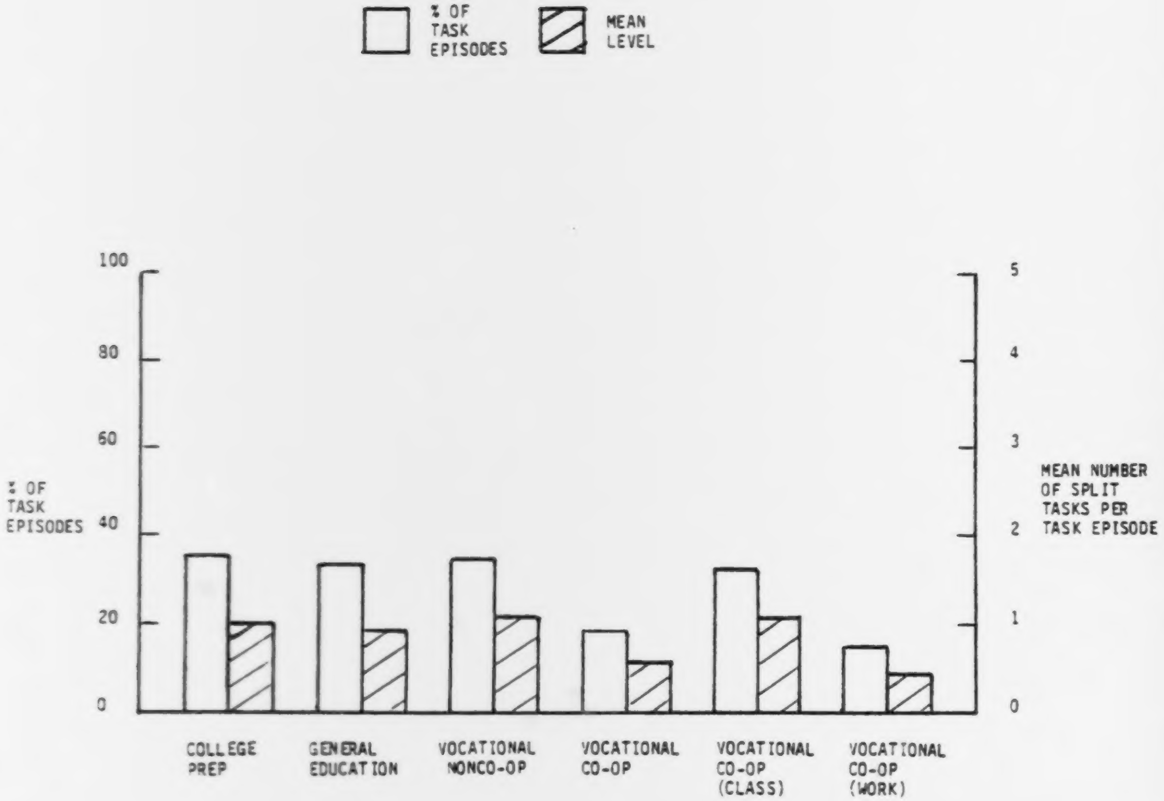

Figure C-17. Percentage of task episodes containing split tasks and mean number of split tasks per task episode by school program.

Significant differences were obtained among school programs and settings in terms of the frequency with which split tasks were observed. The college preparatory program showed the highest frequency of split tasks (35 percent of task episodes); the vocational co-op program showed the lowest frequency (19 percent). The vocational nonco-op and general education programs produced intermediate frequencies (33 percent and 32 percent, respectively). Partitioning the vocational co-op program into its classroom and work site settings indicated that the vocational co-op classroom, though lower than the other three classrooms, was at least comparable to them. In the vocational co-op classroom, 31 percent of task episodes involved split tasks, whereas at the work site only 15 percent of task episodes involved split tasks.

The mean number of split tasks per task episode reflects the pattern established by the frequency data. The vocational co-op program produced a mean number of split tasks per task episode (0.57) that was significantly lower than that for the college preparatory program (1.05) and the vocational nonco-op program (1.02), but was not significantly lower than that for the general education program (0.91). The latter three programs did not differ significantly among themselves.

Separating the vocational co-op program into its classroom and work site components revealed that the work site setting produced a mean level of split tasks (0.41 per task episode) that was significantly lower than that of all the classroom settings. The vocational co-op classroom produced a mean level of 1.01 split tasks per task episode.

Summary Observation Environmental Variables

The environmental variable coordination (figure C-18) was defined as the extent to which the student was required (during the course of the observation) to carry out a variety of tasks, cope with interruptions, and carry out more than one task simultaneously. This variable ranged in level of ascending complexity from an observation consisting of a single uninterrupted task to an observation including a wide variety of tasks that required having to do more than one thing at a time and with numerous interruptions.

With only 2 exceptions, all programs and settings exhibited some level of coordination in 100 percent of the observations. The college preparatory and general education programs exhibited some degree of coordination in 98 percent and 99 percent of observations, respectively. The differences in frequency were not significant.

There were significant differences among the programs and settings in terms of the mean level of coordination observed, although the differences among programs are somewhat vague and difficult to interpret. The vocational co-op program produced a significantly higher mean level of coordination than did the general education program. The former program was not, however, significantly higher than the vocational nonco-op and college preparatory programs. The vocational nonco-op, college preparatory, and general education programs did not differ significantly from one another.

The situation becomes somewhat clearer when the vocational co-op program is partitioned into its classroom and work site settings. The vocational co-op work site setting produced a mean level of coordination that was significantly higher than the level for any of the other settings. These other settings did not differ significantly among themselves.

The environmental variable importance (figure C-19) was defined as the degree to which carrying out the required tasks in the observation would have an impact on the life of the student, other people, and the organization. This variable ranged in ascending level from tasks that had no significant impact on the life of the student, other people, or the organization to tasks that were necessary to ensure the health or safety of the individual or others.

There was no significant difference among any of the programs or settings in terms of the frequency of occurrence of some level of this variable. All programs and settings produced frequencies of approximately 99 percent. There were, however, significant differences in terms of the mean level of importance observed.

The vocational co-op program produced a mean level of importance that was significantly higher than that of any of the other programs. The vocational nonco-op program was significantly higher in terms of mean level of importance than the general education program, but did not differ significantly from the college preparatory program. The latter two programs were not significantly different from one another.

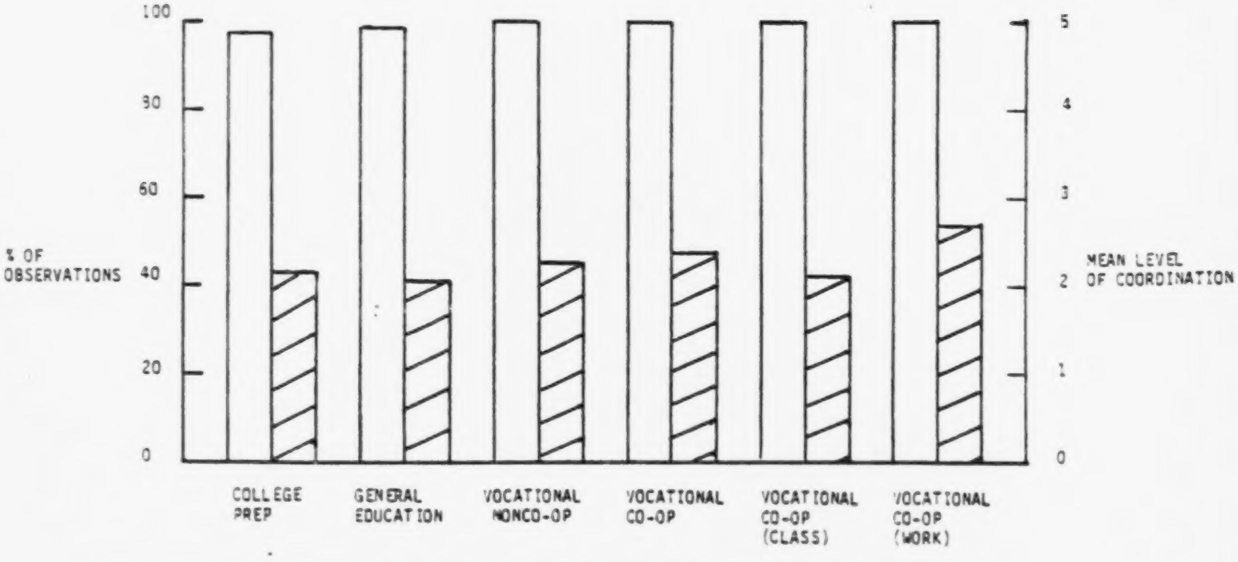

Figure C-18. Percentage of observations exposing students to coordination and mean level of coordination observed by school program.

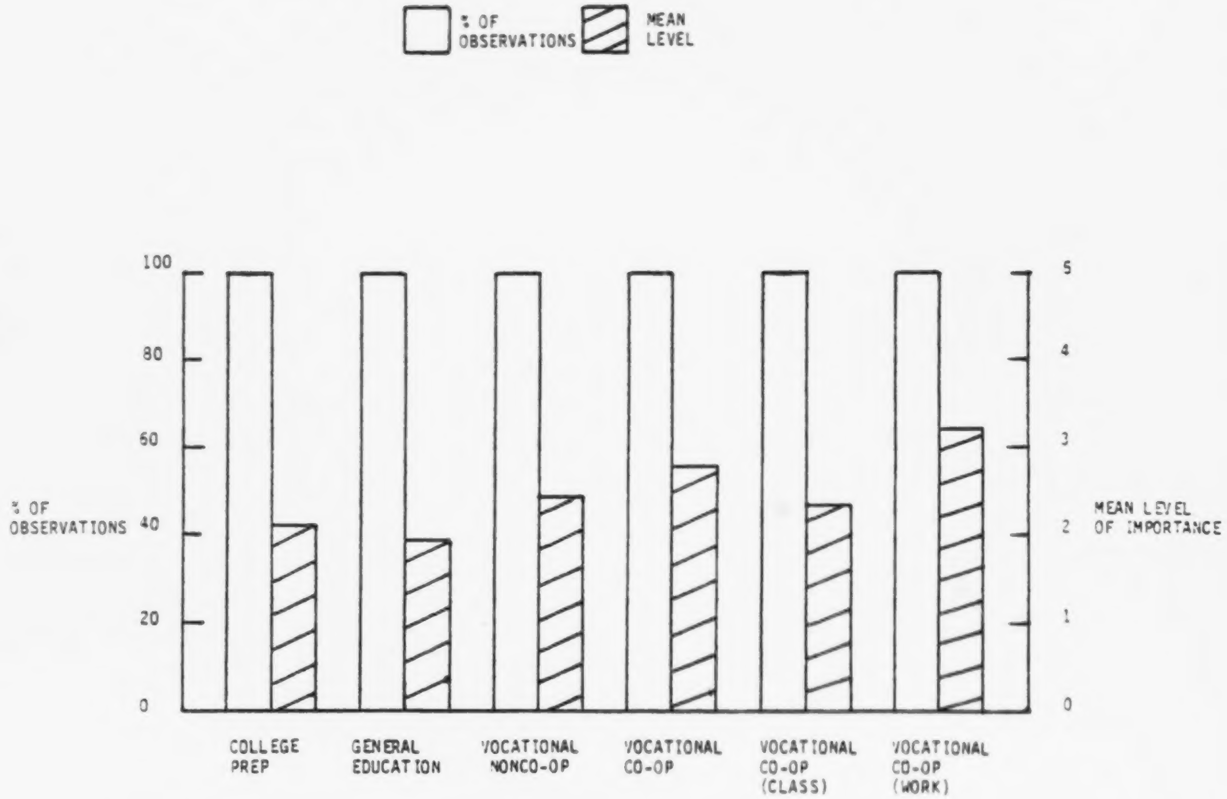

Figure C-19. Percentage of observations exposing students to importance and mean level of importance observed by school program.

Separating the vocational co-op program into its classroom and work site settings indicated that the work site setting produced a mean level of importance that was significantly higher than that of any of the other settings. The vocational co-op and nonco-op classrooms were not significantly different, nor did they differ from the college preparatory classroom. They were, however, significantly higher in terms of importance than was the general education classroom. The college preparatory and general education classrooms were not significantly different with respect to this factor.

The environmental variable instruction (figure C-20) was defined as the proportions of student prescription and discretion in performing the task episodes witnessed during the observation. This variable was intended to index environmental situations ranging in degree of complexity from situations in which almost everything the student needed to know was contained in the assignment to situations in which there was a great deal of uncertainty about what a particular problem represented and how to go about dealing with it.

Once again there were no significant differences between any of the programs or settings in terms of the frequency of occurrence of some level of instruction. It was present to some degree on the average of 99 percent of all observations, regardless of program or setting. There were, however, significant differences among the programs and settings in terms of the mean level of instruction present in the observations.

The college preparatory program produced the highest mean value for instruction, indicating a greater degree of latitude on the part of the student with respect to the way tasks were to be completed. This program was not significantly higher than the general education or vocational nonco-op programs, but was significantly higher than the vocational co-op program. However, these three programs did not differ significantly from one another on this variable.

Partitioning the vocational co-op program into its component classroom and work site settings produced a set of results very similar to that described above. The college preparatory classroom showed the highest mean level of instruction (indicating the highest degree of discretion on the part of the student to determine how a task was to be accomplished), but did not differ significantly from any of the other classroom settings. The vocational co-op work site setting produced the lowest mean level of this variable, indicating that students in this situation had comparatively little discretion in carrying out tasks. This setting differed significantly from only the college preparatory classroom, and was not significantly different from any of the other classroom settings.

The environmental variable feedback (figure C-21) was defined as the extent to which the students received direct and clear information about the effectiveness of their performance. This variable ranged in ascending level of complexity from no feedback (or only indirect feedback) about performance to an evaluation of each and every task performed.

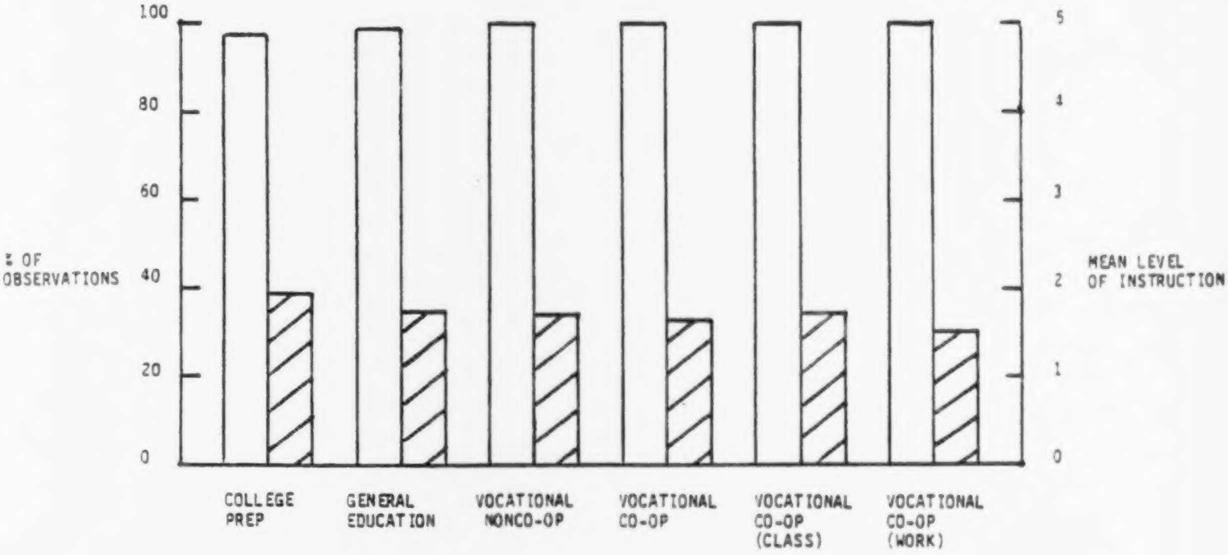

Figure C-20. Percentage of observations exposing students to instruction and mean level of instruction observed by school program.

☐ % OF OBSERVATIONS ▨ MEAN LEVEL

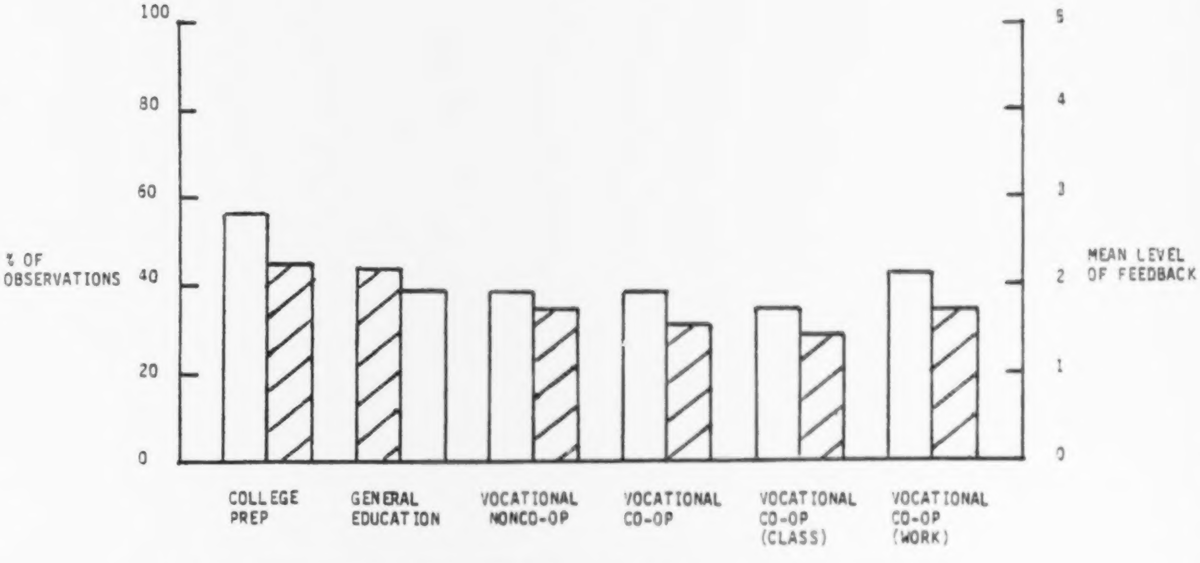

Figure C-21. Percentage of observations exposing students to feedback and mean level of feedback observed by school program.

There were no significant differences observed among any of the school programs or settings in terms of the frequency of observations in which some level of feedback was observed. The observed result, however, was for the college preparatory program to produce the highest frequency of occurrence of this factor (56 percent of observations) and for the vocational co-op program, the lowest frequency (38 percent). The general education and vocational nonco-op programs produced intermediate values (44 percent and 39 percent, respectively). When the vocational co-op program was separated into its classroom and work site components it was apparent that the work site produced a much greater frequency of occurrence of feedback (42 percent of all observations) than did the classroom (33 percent).

There were significant differences among the programs and settings in terms of the mean level of feedback observed. Tests of contrasts among programs, however, revealed that the only significant contrast was between the college preparatory program, which produced the highest mean level of feedback, and the vocational co-op program, which produced the lowest mean level of feedback. When the latter program was partitioned into its classroom and work site components, the only significant difference observed was between the college preparatory classroom and the vocational co-op classroom, the latter showing the lowest mean value of feedback. The mean level of feedback observed in the vocational co-op work site setting was not significantly different from that of any of the classroom settings.

Finally, the environmental variable support was defined as the availability of other people for assistance or instruction during the course of the observation. There were no significant differences among any of the programs or settings in terms of the frequency with which this variable was observed. With only 1 exception, all programs and settings produced frequencies of 100 percent. The college preparatory program produced a frequency of 98.75 percent for all observations, representing some level of support. Since the support data were considered nominal in nature, no analyses of variance or Tukey tests were performed.

To summarize the findings of the observations of the environmental factors, vocational education as a whole and the setting in which vocational education occurs both seem to have some clear-cut advantages and disadvantages. On the positive side, the vocational co-op work site setting showed by far the highest number of major task episode categories per observation, in fact more than twice as many as were observed in the vocational co-op classroom setting. On the other hand, the college preparatory and general education programs showed the lowest number of major task episode categories per observation. If nothing else, this finding at least indicates that vocational students in the work site setting are being exposed to an environment that, first of all, reflects a true work site situation and, secondly, demands numerous shifts in attention during a given time span. Since our findings indicate that the classroom is a far less complex environment in this respect, it seems as though the work site setting may be the environment of choice in which to accustom students to the complexities (in terms of shifting attention) involved in the working environment.

The vocational co-op work site setting also produced a greater frequency of exposure to articulation, the factor that assessed the degree to which a student's performance of a task was necessary for another student or worker to carry out their own task. The difference between the work site and classroom in terms of the frequency of occurrence of this factor was very striking (35 percent of task episodes at the work site as opposed to an average of 9 percent for the classrooms). The vocational co-op classroom scored even lower than the average for the other classes (i.e., 7 percent). This finding indicates that the requirement of understanding the relationship between one's own work and that of one's fellow workers is not being sufficiently addressed in the classroom. A properly constructed work site program would seem best suited to developing this type of awareness on the part of the student.

In terms of the initiation of task episodes, the highest proportions of self-initiated task episodes were found in the vocational classroom and work site settings; in the college preparatory and general education programs, the teacher initiated most task episodes. There are, however, positive and negative aspects of these findings for vocational education. A plus for the vocational classroom is a higher proportion of nonrepetitive self-decisions than in any other classroom; this finding indicates that students are given somewhat more independence to decide which tasks to initiate. Regarding the vocational co-op work site, however, the high proportion of routine or repetitive self-decisions combined with a very low proportion of supervisor-initiated task episodes is not encouraging. This finding may reflect the particular type of work site environments in which students in our sample were placed. It should alert educators to the questionable educational merit of placing their students in a working environment in which the tasks are repetitive and educationally meaningless (e.g., being a maid in a hotel) and the supervisor input is low.

The highest mean level of coordination was found for the vocational co-op work site. Note that the work site setting had the lowest mean number of split tasks per observation and also ranked very low in terms of the number of simultaneous tasks per observation. Consequently, the high rating that this setting received on this factor probably resulted from the significantly greater number of major task episode categories required at the work site. As such, this factor serves to reinforce the finding that, in terms of the sheer number of things that need to be attended to in a period of time, greater demands are placed on the student in the work site than in the classroom.

The vocational co-op work site setting also resulted in the highest mean level of importance in comparison to the other settings observed. This finding indicates that at the work site students are engaged in activities perceived to have more impact on their own life, on that of other people, and on the organization than when they are in the classroom. The college preparatory and general education classroom settings resulted in the lowest mean values of importance. What is the relevance of this particular finding? The greater importance attached to successful task completion in the work environment may greatly add to its face validity as compared to the classroom. In the latter setting students all too often complain that the tasks they are assigned seem meaningless and represent abilities that they "will never need to know" in the real world. In spite of the highly questionable assumptions underlying that typical complaint, these data indicate that educators may be able to exploit the greater degree of importance attached to task episodes in the work site as a vehicle for increasing basic skills competency.

On the negative side, the vocational programs were significantly lower than the college preparatory and general education programs in terms of the mean level of autonomy observed. This indicated an apparent emphasis in vocational programs on limiting the number of ways a student can accomplish a task. This tendency was more pronounced in the classroom than in the work site. In many situations in vocational education, it may, for reasons of safety, be important to restrict the range of student experimentation when it comes to operating dangerous machinery. Nearly all theories of learning (cf., Bower and Hilgard 1981), however, emphasize the importance of variation and experimentation for effective learning and subsequent retention of material. Vocational educators may wish to allow their students greater flexibility to accomplish their tasks in situations where it is safe to do so.

The factor instruction was included to assess the proportion of student discretion and prescription in completing a task. The results replicate the finding that college preparatory and general education environments were more highly prescribed in nature. The vocational co-op work site setting resulted in the lowest mean level of student discretion. This finding may indicate that the tasks themselves are so one-dimensional in nature that individual discretion in performance of the the task is meaningless. Or it may indicate that the employers are emphatically concerned with communicating the "right way" of doing things (as is typical in many apprenticeship programs) at the expense of allowing the student to experiment on his own. Once again, the point bears repeating that learning and retention are most effective when material is presented in different contexts with the student exerting some control over the situation.

Finally, in terms of teacher/supervisor feedback, the college preparatory classroom seemed to provide the most opportunity for feedback, whereas the vocational co-op classroom afforded the least opportunity. A somewhat higher frequency and level of feedback in the vocational co-op work site setting may help to offset the low levels observed in the vocational co-op classroom. Theories of learning since the time of Thorndike's Law of Effect (1911) have emphasized the overriding importance of consistent feedback in the acquisition and retention of behaviors and/or concepts. In light of the accepted importance of feedback for learning, it would seem that all the programs and settings in this study showed a surprisingly low level of this factor.

Relationships between Basic Skills, and Attentional, and Environmental Factors

In order to further investigate the relationships among basic skills and the attentional and environmental factors used to characterize the school programs and settings, correlational analyses were carried out to measure the strength of association between the observed levels of the basic skills and the attentional and environmental factors. This analysis will help to point out factors that, in our sample, co-occurred with either high or low levels of basic skills. The reader should bear in mind, however, that correlation does not necessarily imply causality. In other words, a highly positive correlation between an environmental factor and a basic skill does not necessarily mean that high levels of the former *caused* high levels of the latter. In this case, the strongest statistical statement that can be made is that there was a strong tendency for high levels of the environmental factor to co-occur with high levels of the basic skill. In operational terms, however, the educator may find that the careful exploitation of environmental factors correlating significantly with basic skills could result in increasing the probability of student learning. Appendix D deals with cause or relationships affecting basic skills acquisition.

Correlations Between Basic Skills and Attentional Measures

Table C-15 illustrates the correlation between each basic skill and each attentional factor, along with the corresponding level of significance attained. Although nearly all cells in the

TABLE C-15

CORRELATIONS BETWEEN BASIC SKILLS AND ATTENTIONAL MEASURES

Attentional measures	Basic Skills					
	Language	Mathematical	Reading	Reasoning	Speaking	Writing
Data function	.352 X_3	.280 X_3	.384 X_3	.620 X_3	.008 n.s.	.263 X_3
People function	.069 X_1	.005 X_1	-.117 X_3	.206 X_3	.689 X_3	-.141 X_3
Things function	.095 X_2	.180 X_3	.133 X_3	.156 X_3	-.092 X_2	.159 X_3
Data orientation	.285 X_3	.259 X_3	.434 X_3	.357 X_3	-.275 X_3	.416 X_3
People orientation	-.122 X_3	-.131 X_3	-.306 X_3	-.137 X_3	.472 X_3	-.309 X_3
Things orientation	-.150 X_3	-.121 X_3	-.104 X_3	-.208 X_3	-.229 X_3	-.082 X_2

KEY:

n.s. = not significant
X1 = $p \leq .05$
X2 = $p \leq .01$
X3 = $p < .0001$

table contain significant correlations, discussion will be limited to those that are particularly large or considered particularly interesting.

Data function--i.e., the level of information, ideas and facts used by the student--correlated quite highly with all but one of the basic skills (speaking). The same statement is true of data orientation--i.e., the percentage of the student's involvement with data in contrast to people and things--although this factor had a significantly negative correlation with speaking. High levels of reasoning skills, requiring the student to deal with theory versus practice or abstract versus concrete situations, and high levels of reading skills were the two basic skills that correlated the highest with the two data factors. However, strong correlations with the data factors were also shown for language, math, and writing skills. In comparison with the other attentional factors, high levels of the data variables seem to be most highly correlated with high levels of all the basic skills except speaking. It seems that these skills are strongly data driven; furthermore, our results seem to argue that the higher the level of data function and orientation required by the environment, the greater are the demands placed on the student to use higher levels of these basic skills.

Conversely, people function--i.e., the level of the student's interaction with students, co-workers, teachers, or supervisors--and people orientation--i.e., the percentage of the student's involvement with people in contrast to data and things--do not seem to correlate highly with any of the basic skills except speaking. This finding is not particularly surprising since speaking necessarily implies some level of orientation to other people. What is interesting, however, is that high levels of people function co-occur with high levels of speaking skills. This finding implies that as the level of interpersonal behavior rises from simply taking instructions and/or exchanging information to instructing, teaching, or supervising, the level of speaking skills observed also increases. This finding would indicate that instructors interested in increasing the level of their students' speaking skills may find it more effective to do so by increasing the level, not necessarily the amount, of personal interaction that takes place in the classroom.

Things function--i.e., the level of the student's physical interactions with objects--and thing orientation--i.e., the percentage of the student's involvement with things in contrast to data and people--showed few strong positive or negative correlations with any of the basic skills. There seems to be a tendency for high levels of things function to co-occur with high levels of the basic skills, but in all cases high levels of thing orientation show a tendency to co-occur with low levels of basic skills. The latter finding is consistent with the earlier statement that increased levels of basic skills demanded of the students seem to be positively correlated with orientation to data at the expense of orientation to data and things.

Correlations between Basic Skills and Environmental Measures

In contrast to the attentional measures, there were far fewer occurrences of significant correlations between the environmental and basic skill measures (see table C-16). Nevertheless, several of the relationships merit discussion.

The occurrence of split tasks as an environmental measure correlated most highly with high levels of reasoning. It seems intuitively reasonable that greater levels of reasoning would be required in those relatively complex environments in which tasks are often interrupted and must be resumed later. In this case, reasoning may take the form of cognitively organizing one's time to make sure the demands of the task situation are met.

Another interesting finding is the relatively high correlation between importance--i.e., the degree to which carrying out the required tasks will have on impact on the life of the student, other people, and the organization--and speaking skill. This significant correlation is probably a result of the high co-occurrence of both in the work site in which higher levels of speaking and importance were observed. The lower, and in most cases negative, correlations between the other basic skills and importance indicate that observations characterized as high on the importance measure were generally ranked low on these basic skills.

The relatively high correlation observed between the environmental variable coordination--i.e., the extent to which task episodes required the student to carry out a wide variety of tasks, cope with interruptions, and carry out more than one task

TABLE C-16

CORRELATIONS BETWEEN BASIC SKILLS AND ENVIRONMENTAL MEASURES

Environmental measures	Basic Skills					
	Language	Mathematical	Reading	Reasoning	Speaking	Writing
Split tasks	.076 X_2	-.026 n.s.	.115 X_3	.139 X_3	-.049 n.s.	.072 X_2
Simultaneous tasks	.005 n.s.	-.023 n.s.	.013 n.s.	-.001 n.s.	-.021 n.s.	.022 n.s.
Importance	-.150 X_3	.002 n.s.	-.187 n.s.	-.044 n.s.	.235 X_3	-.150 X_3
Coordination	.002 n.s.	-.019 n.s.	-.087 X_2	-.027 n.s.	.293 X_3	-.121 X_3
Feedback	.046 n.s.	-.066 X_1	-.005 n.s.	.137 X_3	.233 X_3	-.052 n.s.
Instruction	.068 X_1	-.125 X_3	.045 n.s.	.083 X_2	.173 X_3	-.045 n.s.
Major task episode categories	-.187 X_3	.062 X_1	-.279 X_3	-.048 n.s.	.183 X_3	-.235 X_3

KEY:

n.s. = not significant
X1 = $p \leq .05$
X2 = $p \leq .01$
X3 = $p \leq .0001$

simultaneously--and the basic skill of speaking is probably also a result of the high proportion of occurrence of both in the work site. But the same conclusion cannot be drawn in regard to the high correlation between speaking and the environmental variables of feedback and instruction because the work site did not show a significantly higher level of either variable than did the classroom. Regardless of settings, high levels of these variables tend to co-occur with high levels of speaking skills demanded of the student.

The relatively high correlation between the number of major task episode categories and the level of speaking skill observed can probably be attributed to high occurrence of both in the work site setting. It is interesting to note, however, that relatively low correlations occur for this environmental variable and the basic skills of reading, writing, and language. This finding seems to indicate that higher levels of these skills tend to be observed in those environments, i.e., the classroom, in which the number of major task episode categories is comparatively low.

APPENDIX D

BASIC SKILLS ACHIEVEMENT

An Initial Evaluation of Students' Basic Skills Performance

Dependent Measures--Basic Skills Achievement

As indicated in chapter 2, the assessment of the cooperating students' basic skills achievement was undertaken at 3 points in time during the 1984-85 school year (i.e., in the fall, winter, and spring) via the use of selected mathematics and reading items from the National Assessment of Educational Progress (NAEP) test item pool and the Reading Comprehension and Mathematics Concepts and Applications Tests from the Comprehensive Tests of Basic Skills (CTBS) - Form V, Level J. Brief descriptions of those tests (which were employed during all 3 test administrations) are presented in table D-1.

For the purposes of this initial assessment of the project data, the decision was made to compute a total mathematics score and a total reading score (per test administration) based upon the combined sets of mathematics and reading items. The data from the fall testing were used to complete the initial generation and analysis of the two designated scores. That analysis, which is summarized in the first part of table D-2, resulted in the deletion of several "bad" items from the respective total scores (see the item counts noted in the table). These decisions were based upon the alpha coefficients and various item statistics (e.g., item variances, item-total score correlations). Subsequently, the descriptive statistics shown in table D-2 and

TABLE D-1

DESCRIPTIVE SUMMARY OF ITEMS USED TO ASSESS BASIC SKILLS ACHIEVEMENT

Basic Skill Measured	Source of Items/Test	Number of Items	Description of Items/Test
Mathematics	NAEP	24	- short answer, "word problems" representing the concepts of numbers, numeration (14), and measurement (10)
	CTBS	45	- multiple choice items representing the concepts of numeration (6), number sentences (10), number theory (8), problem solving (11), measurement (5), and geometry (5)
Reading	NAEP	15	- multiple choice items (clustered in groups of 5 items each by passages) representing such concepts as comprehension of words and lyrical relationships (5), comprehension of propositional relationships (5), comprehension of textual relationships (3), and appreciation of reading (2)
	CTBS	45	- multiple choice items (clustered in groups of variant sizes by passages) representing such concepts as passage details (6), character analysis (4), main idea (8), generalization (12), written forms (6), and writing techniques (9)

TABLE D-2

SUMMARY-INITIAL ANALYSIS OF (DEPENDENT) BASIC SKILLS MEASURES

Testing Time	Descriptive Statistics	Basic Skills Measures (A) Mathematics (68 items)	 (B) Reading (56 items)
Fall	Alpha coefficient (internal consistency reliability estimate)	.95	.89
	Estimated mean and variance, sample size	29.30, 164.08, 415	34.42, 113.78, 415
Winter	Estimated mean and variance, sample size	31.85, 174.44, 388	35.00, 114.85, 388
Spring	Estimated mean and variance, sample size	30.82, 203.66, 346	32.23, 163.16, 345
Fall-Winter	Correlation (test-retest reliability estimate ["stability" estimate])	.86	.78
Fall-Spring	Correlation (test-retest estimate)	.75	.61
Winter-Spring	Correlation (test-retest estimate)	.76	.68

figure D-1 for fall, winter, and spring were computed. Overall, these results suggest that the two total scores represent reliable ("good") indicators of students' achievement in the associated areas--mathematics and reading.

The only potential problem signaled by the analysis shown in table D-2 is the attrition rate observed over the 3 test administrations. More specifically, the loss in sample size, particularly the loss that occurred from winter to spring, could well affect the generalizability of the evaluation results and will need to be considered when interpreting those results.

Independent Variables

During the course of the 1984-1985 school year, data on numerous (potential) independent variables were collected and retained as part of the project database. For this initial evaluation the decision was made to look at the relationships of a reduced number of those variables to basic skills achievement (as part of the overall effort to describe which students learn which basic skills in which settings). That limited set of independent variables was grouped in terms of the following three clusters:

- Design-related: The variables in this cluster were integral to the implementation of the overall sampling approach used in the project.
- Demographics: The three variables in this cluster served to describe selected demographic characteristics of the sampled students.
- Other characteristics: This cluster included variables that dealt with the students' experiences in school, their school-related activities (e.g., course taking), and their educational plans.

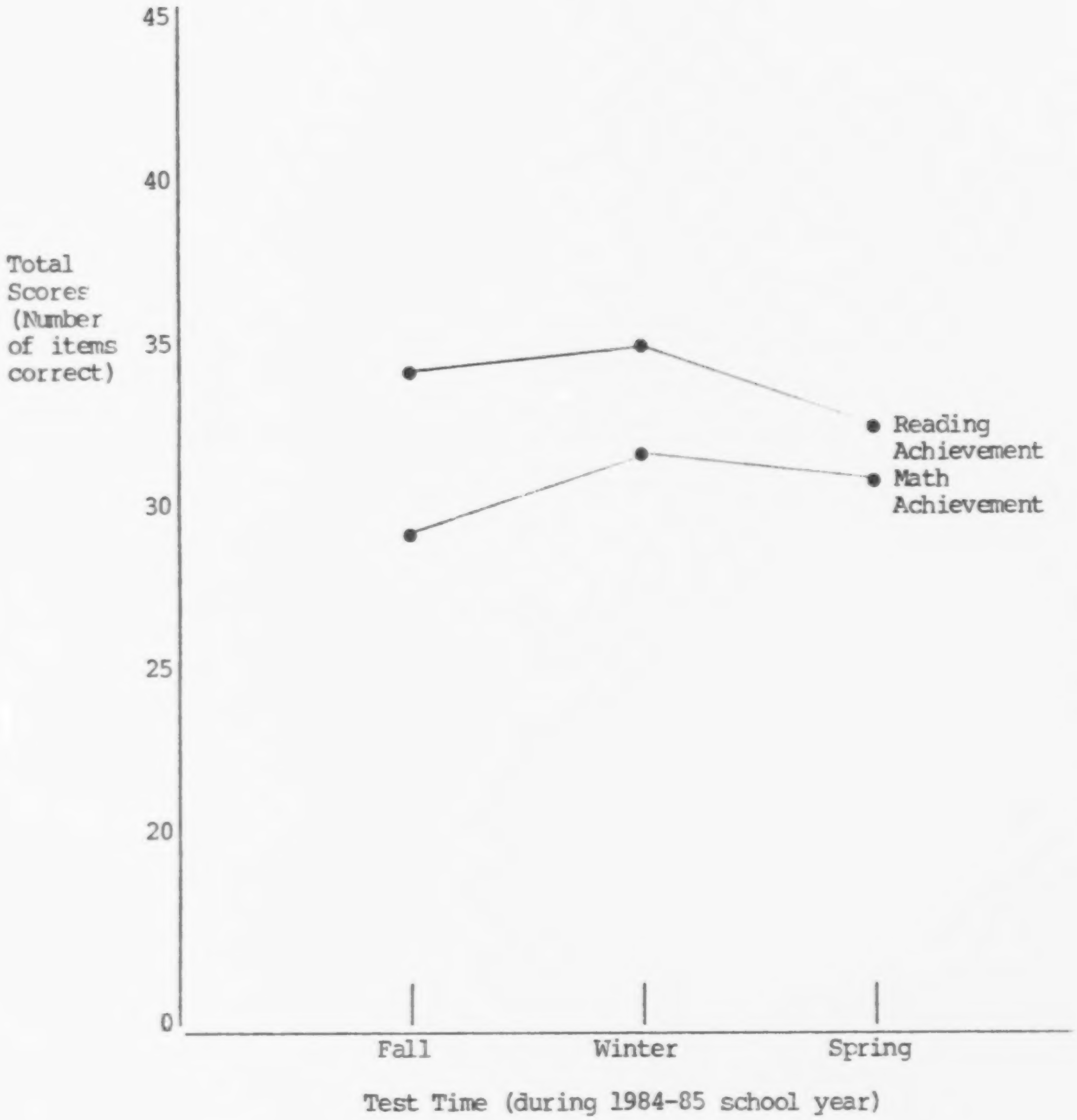

Figure D-1. Summary--average total scores over test times

The specific variables subsumed within each of these clusters are listed and described in table D-3.

Statistical Analysis

To assess the nature of change in basic skills achievement for the fall-winter and winter-spring periods while maintaining the hierarchical structure required to control for confounding effects induced by sampling constraints, the analysis of partial covariance was selected as the statistical method (Cohen and Cohen 1975). This method is a special case of multiple regression which proceeds sequentially through a proposed hierarchical structure to analyze clusters of independent variables, that is, covariates. As each cluster is entered into the equation, the R^2, cumulative R^2, and R^2 change for the whole cluster are computed as well as the partial coefficients b of each variable in the cluster as it enters.

In applying this method to the study of change, the posttest score is treated as the dependent variable; the first independent variable to enter into the regression equation is the pretest score of the same variable, the covariate. This treatment removes the amount of variance in the posttest variable that is a linear function of the pretest variable. The variance remaining reflects that variance due to regressed change, that is, the variance of the residuals that have a zero correlation with the pretest variable. After this step, the clusters of independent variables enter the equation according to the predetermined hierarchy. It

TABLE D-3

DESCRIPTIONS OF THE INDEPENDENT VARIABLES EMPLOYED DURING THE EVALUATION

Variable Cluster	Variables	Description
Design-related*	- SCHOOL	- School building: 6 levels or schools
	- PROGRAM	- 4 levels: P_1=Academic, P_2=General, P_3=Vocational Nonco-op, P_4=Vocational Co-op
	- SCHOOL GRADE	- 2 levels: 1=10th and 11th grades, 2=12th grade
	- CLASS w P w S	- Classes within programs within schools--multiple levels/numbers per program x school combinations
Demographics	- SEX	- 2 levels: 1=Male, 2=Female
	- RACE	- 2 levels: 1=White/Caucasian 2=Nonwhite/Others
	- LUNCH CAT	- Lunch category, 2 levels: 1=No Assistance, 2=Received Assistance or Free Lunch (This variable was viewed as a rough proxy for SES.)
Other characteristics	- PROGRAM-SELF REPORT	- 3 levels: 1=Academic, 2=General, 3=Vocational (This variable was defined via two dummy variables in subsequent analyses--Academic vs. Vocational and General vs. Vocational.)
	- HOW FAR do you think you will get in school?	- 6 levels from 1=High School Graduation or Less to 6=Ph.D., M.D., or Other Advanced Degree
	- GRADES so far in high school	- 5 levels from 1=Half to Mostly A's to 5=Mostly D's or half C's, half D's
	- How many HOURS per day do you watch TV?	- 6 levels ranging from 1=Less than 1 hour to 6=More than 5 Hours

*An overview of the relationships (i.e., interdependencies and confounding) among the variables in this cluster is presented in figure D-2.

TABLE D-3--Continued

Variable Cluster	Variables	Descriptions
Other characteristics (continued)	- Have you had a PART-TIME JOB that is not school-related?	- 2 levels: 1=No, 2=Yes
	- Have you had a PART-TIME JOB (school or non-school related) during the 1984-1985 school year?	- 2 levels: 1=No, 2=Yes
	- What is the average amount of time you spend on HOMEWORK per week?	- 5 levels ranging from 1=None to 5=More than 5 hours
	- Perception of degree to which school fosters/ allows independent action/activity	- 4 levels ranging from 1=Low Degree of Independence to 4=High Degree of Independence
	- Number of extracurricular activities in which a leadership role was pursued	- 5 levels ranging from 1= None to 5=4 or More Activities
	- Number of extracurricular activities participated in	- 9 levels ranging from 1= None to 9=8 or More Activities
	- Number of vocational courses taken	- 6 levels ranging from 1= None to 6=5 or More Courses
	- Number of academic courses taken	- 10 levels ranging from 1= None to 5=17 or More Courses

		CLASSES w P w S						
		A		B		C		
		School Grade		School Grade		School Grade		Number
Schools	Programs	1 (10th or 11th)	2 (12th)	1 (10th or 11th)	2 (12th)	1 (10th or 11th)	2 (12th)	of Classes
1	P_1	x	x					1
	P_2	x	x					1
	P_4		x		x			2
2	P_3		x	x				2
3	P_1	x						1
	P_2	x	x					1
	P_4		x	x	x			2
4	P_1		x					1
	P_2	x	x					1
	P_4		x		x			2
5	P_3		x	x	x	x		3
6	P_1	x	x					1
	P_2	x	x	x	x			2
	P_4		x	x	x			2

Figure D-2. Summary of relationships among the four design-related variables*

*In figure D-2 "x's" are used to denote the School-Program-School Grade-Classes w P w S combinations where samples of students exist. Note the "incomplete" nature of the design as well as the interdependencies between School and Program (S_2 and S_5 and P_3) and School-Program-School Grade. These interdependencies are discussed in more detail in the section on methodology that follows.

is important in this type of analysis to determine the amount of residual variation remaining beyond the initial adjustment for the pretest scores and to compute the proportion of this variance due to each cluster.

Findings for the Basic Skills Achievement Tests

The following discussion presents explanations of the analysis performed on the basic skills achievement tests using the analysis of partial variance method described above. In this analysis references to test scores refer, in all cases, to the total mathematics or total reading score created from both the CTBS and the NAEP for the respective skills. The analysis will be presented in four separate parts, one each for mathematics basic skills, fall and winter, and one each for reading basic skills, fall and winter.

Evaluation of Mathematics Achievement--Fall to Winter

In the regression analysis for mathematics achievement, it was found that 74 percent of the total variance about the winter mathematics test score was linearly accounted for by the score obtained on the mathematics test administered at the fall testing. With this variance removed, the remaining variability, 26 percent, represents regressed change, that is, the variance of the residuals. Since there was confounding due to the nature of the sampling, clusters of independent variables reflecting what were deemed to be the most likely sources of confounding were entered into the equation to extract sources of uncontrolled variation. The first cluster of these variables consisted of various demographic characteristics of the students, such as sex, race, and a proxy for socioeconomic status. These variables produced a negligible increase in the cumulative total variance explained (R^2), see table D-4. The amount of regressed change explained was also small (i.e., less than 2 percent of the amount remaining).

The 2d cluster forced into the equation consisted of a contrast between students in the 11th grade with seniors. As in the previous cluster, this cluster also produced little explanation of either total variance or regressed change. The final cluster entered into the model to reduce uncontrolled variation before the effect of educational program was assessed, removed confounding due to school. This cluster included contrasts between schools; although explaining little more than 1 percent of the total variation, this cluster removed approximately 5 percent of the variance of regressed change, thus reducing the confounding effect of school.

With the correlation of fall to winter mathematics achievement scores removed and the confounding due to demographic, grade level, and school differences controlled, program effect was assessed. Three variables, each contrasting academic, general, or vocational noncooperative programs with vocational cooperative programs were used to estimate program effects. This cluster accounted for little of the total variation in the model, although it did account for 6.5 percent of the regressed change.

Analysis of the program effects indicate that, when adjusted for pretest mean difference and confounding effects, students in academic programs performed significantly better on the

TABLE D-4

ANALYSIS OF MATHEMATICS PERFORMANCE

Effect	Independent Variables	Fall to Winter				Winter to Spring			
		b	Std. Err. b	R^2 Change	Rgrssd Change	b	Std. Err. b	R^2 Change	Rgrssd Change
Covariate	Previous Achievement Score	0.89[b]	.03	.74[b]	-----	0.82[b]	.04	0.59[b]	-----
Demographic (background) variables	Sex	-1.69	.78	0.004	0.015	1.29[a]	1.08	0.008	0.020
	Race	-0.22	.82			-2.49[a]	1.13		
	Socioeconomic status	-0.17	.45			.52	.62		
School grade	Grade in school (11 vs. 12)	-1.22	.74	.022	0.008	-2.17[a]	1.01	.005[a]	0.012
Schools	School 1 vs School 6	3.06[b]	.76	.014	0.054	-6.97[b]	1.01	.077[b]	0.188
	School 2 vs School 6	-3.89[b]	1.18			-3.16[a]	1.48		
	School 3 vs School 6	-0.68	.90			4.24[b]	1.13		
	School 4 vs School 6	0.65	.74			3.61[b]	.95		
Program	Academic vs. Cooperative	3.14[b]	.72	.017	0.065	2.33[a]	.97	.007	0.017
	General vs. Cooperative	.55	.80			-2.19[a]	1.07		
	Noncooperative vs. Cooperative	-1.40	.83			-0.18	1.07		
Residual class effects	Miscellaneous classroom effects (See figure D-2 for individual variables)	-3.11[b]	1.11	.024[b]	0.092	0.76	1.61	.014	0.034
		0.81	1.31			0.56	1.85		
		1.60	1.24			-0.11	1.65		
		-1.35	1.41			-0.00	1.95		
		3.12[a]	1.33			1.00	1.85		
		0.06	1.28			-0.65	1.80		
		-0.69[a]	1.10			3.51[a]	1.51		
		-3.46	1.61			-1.49	2.14		
		2.38	1.29			-0.44	1.71		
		0.47	1.06			1.07	1.37		
		2.64	1.53			-3.13	2.08		
		2.04	1.16			0.63	1.55		
		-0.37	1.67			-1.96	2.65		
		-0.76	1.21			-1.00	1.68		
Other student characteristics	Perceived program Academic vs. Voc.	-0.10	.77	0.018[b]	0.069	-0.48	1.11	0.023[a]	0.056
	Perceived program General vs. Voc.	2.29[b]	.77			-1.22	1.09		
	Expected education	0.55	.31			-0.18	.43		
	Current grades	0.87	.33			1.21[b]	.44		
	Hours TV per day	0.18	.21			0.06	.29		
	Part-time job—not school related	-0.42	.93			-0.57	1.29		

TABLE D-4--Continued

Effect	Independent Variables	Fall to Winter b	Fall to Winter Std. b	Fall to Winter R^2 Change	Fall to Winter Rgrssd Change	Winter to Spring b		Winter to Spring R^2 Change	Winter to Spring Rgrssd Change
Other student characteristics (continued)	Part-time job--84/85	0.76	.94			-0.66	1.31		
	Hours homework per week	0.15	.31			0.15	.43		
	School allows independent action	0.53	.31			-0.98	.43		
	Leadership--extracurricular	-0.13	.35			0.64	.48		
	Participation--extracurricular	-0.08	.18			-0.36	.24		
	No. vocational courses	0.09	.28			-0.61	.39		
	No. academic courses	0.14	.22			0.56	.31		
				0.796	0.303			0.692	0.327

^{a} $p < .05$, ^{b} $p < .01$

mathematics achievement test at the winter testing than did students in the vocational cooperative programs ($b = 3.14$, $p < .01$). Adjusted means for these two programs were 34.35 and 28.84, respectively. And, while the average adjusted change indicated that mathematics scores of academic students increased 4.4 points from fall to winter, the same was not so for students in cooperative programs. Scores of these students exhibited a slight decline of just over one point (see table D-5). The contrast between general programs and the vocational cooperative programs was not statistically significant; this finding suggests that after adjustments for the covariate and confounders, the mean performance of students in these two programs was similar. Comparison of the cooperative and noncooperative vocational programs also did not produce a significant effect, but the negative partial coefficient ($b = -1.40$) implies that students in the cooperative program performed better on the winter mathematics achievement test than did students in the noncooperative vocational program. Students in cooperative programs attained an adjusted mean value of 33.24 and an average adjusted change of 3.50 points during this period, whereas for students in the noncooperative programs, with mean value of 30.45, who failed to show much improvement, the average adjusted change was 0.50.

Prior to examining the effect of students' experiences in school, educational expectations, and school-related activities on mathematics performance at the winter testing, a cluster of variables to control for extraneous design characteristics was

TABLE D-5

ADJUSTED CONTRAST AND CHANGE MEANS FOR MATHEMATICS ACHIEVEMENT BY PROGRAM CONTRASTS

Program Contrast	Fall to Winter		Winter to Spring	
	Adjusted Means	Adjusted Change Means	Adjusted Means	Adjusted Change Means
Academic	34.3505	4.4025	33.7089	1.7859
Cooperative	28.8420	-1.1060	29.1559	-2.7671
All others (mean)	31.5963	1.6483	31.4324	-0.4906
General	32.0106	2.0626	28.8221	-3.1009
Cooperative	31.9306	1.9826	33.3391	1.4161
All others (mean)	31.9706	2.0226	31.0806	-0.8424
Noncooperative	30.4489	0.5009	30.8901	-1.0329
Cooperative	33.2453	3.5050	31.2515	-0.6715
All others (mean)	31.8471	1.8991	31.0701	-0.8529

forced into the model. The purpose of this cluster was to reduce the unexplained variance that was considered to result from the confounding of classes within programs within schools (see figure D-1). In total, this cluster of residual class effects reduced the unexplained variance by 9 percent. While an analysis of the separate effects of this cluster is not central to this study, it is worth noting that this cluster does account for more variance in regressed change than any other cluster.

Upon entry into the model, the cluster of variables representing the students' personal characteristics accounted for nearly 7 percent of the regressed change in mathematics achievement scores. Of the 13 variables used in this cluster, only the contrast between students who classified their school program as general and those who classified theirs as vocational proved to be statistically significant. The unstandardized partial regression coefficient for this variable with a slope of 2.29 ($p < .01$) indicated that students who reported themselves to be enrolled in a general education school program performed better on the test under consideration than did students who reported themselves to be enrolled in vocational programs. While at first glance this finding may appear to be inconsistent with that of the previously discussed program effect, it is not contradictory. In the assessment of program effect, three contrast variables were used, each of them comparing a school program to the cooperative program; as such, the two vocational programs were separated. The current variable under consideration, self-reported program, combined the two vocational programs.

Evaluation of Mathematics Achievement--Winter to Spring

Analysis of mathematics achievement from winter to spring produced a more encompassing explanation of the factors influencing change in mathematics test scores. Using the winter mathematics scores as the covariate with which to remove the correlated effect from the spring mathematics scores accounted for 59 percent of the total variance in the spring scores, leaving 41 percent of this variance to represent regressed change (see table 4). The first cluster of independent variables entered into the model, comprised of the demographic characteristics of the students, accounted for a little less than 2 percent of the residual variance. Although the amount of variance explained was small, two of the three variables in this cluster were statistically significant. The slope of the coefficient for gender ($b = 1.29$, $p < .05$) indicated that, after adjustment for the winter mathematics test mean difference, female students obtained higher spring mathematics achievement scores than did their male counterparts. Also significant was the coefficient for student's race ($b = -2.49$, $p < .05$). This coefficient indicated that mathematics achievement scores for minority students were declining over the period under discussion.

The contrast for school grade, contained in the third cluster, accounted for a small but significant amount of variance of regressed change in this analysis. The coefficient obtained for school grade ($b = -2.18$, $p < .05$) indicated that students in the 12th grade failed to perform as well as students in the 11th grade. The cluster consisting of the contrasts used to remove the confounding effects of schools was then entered into the model. This cluster accounted for nearly 19 percent of the remaining residual variation, more than any other cluster in this model.

When the cluster or program effects were entered, less than 2 percent of the regressed change was explained. Of the three contrasts tested in this cluster, two were statistically significant. As in the previous analysis of mathematics achievement scores, after controls were applied for winter test mean differences and confounding variables, students in academic programs showed higher scores on the spring test than did students in the vocational cooperative program ($b = 2.33$, $p < .05$). The adjusted mean score for students in academic programs was 33.71 in comparison to 29.16 for students in cooperative programs. Adjusted mean change for the former students was 1.79, indicating an increase in mathematics achievement during the period under consideration. The corresponding adjusted mean change for cooperative students declined by nearly three points following a trend that had emerged at the previous testing.

The contrast between general and cooperative program was also significant ($b = -2.19$, $p < .05$). This contrast indicates that while the spring mathematics test scores had declined for students in general educational programs, the scores for students in the cooperative program had increased during this segment of the study. Adjusted means for these two programs were 28.82 and 33.34, respectively. Examination of the adjusted change means (see table D-5) showed that in this comparison, students in the cooperative program demonstrated an increase in mathematics achievement, whereas those in the general programs had decreased by just over 3 points. Finally, the lack of statistical significance for the contrast between noncooperative and cooperative programs indicated that students in these two programs exhibited about the same degree of change with respect to the spring mathematics achievement test.

Entry of the cluster of residual class effects produced only a marginal adjustment in regressed change and thus did not reduce much of the confounding due to sampling problems. However, the cluster containing the other student characteristics did explain a significant amount of the regressed change. In this analysis the only statistically significant variable in this cluster was current grades, a self-reported item used as a proxy variable for grade point average. The slope obtained for current grades ($b = 1.21$, $p < .01$) indicated that, after adjustments for all previous confounding and model effects, by year's end students' reporting higher grades had attained a greater increase in regressed change.

Evaluation of Reading Achievement--Fall to Winter

In this analysis of reading achievement the covariate, total reading test score obtained at the fall testing, explained 61 percent of the total variation in the dependent variable, reading test score obtained in the winter. With 39 percent of regressed change to be explained, the first 3 clusters of independent variables to enter the model failed to provide any explanation of the remaining variation or to remove any influence of confounding prior to the analysis of program effects (see table D-6).

Program effects, in total, accounted for nearly 10 percent of the remaining variation in the dependent variable. All three program contrasts proved to statistically significant in this analysis. With a coefficient of 3.26 ($p < .01$) for the contrast between academic and cooperative programs, it was apparent that students in the former program had attained higher reading achievement scores at the winter testing than did the students in the cooperative program (37.44 and 33.14, respectively). The adjusted mean change (see table D-7) indicated that students in academic programs had increased their reading skills by 2.5 points, whereas students in the cooperative program had declined by 1.5 points. Likewise, the contrast comparing the effects of general educational and cooperative programs indicated that students in the general program had performed better on the winter reading test than did those students in the cooperative program ($b = 1.57$, $p < .05$). The adjusted means for these 2 programs were 35.19 and 34.92, respectively, indicating students in general programs had performed somewhat better than those in the

TABLE D-6

ANALYSIS OF READING PERFORMANCE

Effect	Independent Variables	Fall to Winter				Winter to Spring			
		b	Std. Err. b	R^2 Change	Rgrssd Change	b	Std. Err. b	R^2 Change	Rgrssd Change
Covariate	Previous Achievement Score	0.81^b	.03	0.614^b	-----	0.80	.05	0.477^b	-----
Demographic (background) variables	Sex	-0.51	.76	0.004	0.010	-0.30^a	1.10	0.001	0.002
	Race	-1.47	.79			-0.69	1.14		
	Socioeconomic status	0.08	.44			0.38	.63		
School grade	Grade in school	-0.44	.72	0.000	0.000	-3.22^b	1.03	0.016^b	0.030
Schools	School 1 vs School 6	0.01	.77	0.005	0.013	-8.04^b	1.00	0.106^b	0.202
	School 2 vs School 6	-2.36^a	1.19			-1.50^a	1.48		
	School 3 vs School 6	1.26	.91			5.12^b	1.13		
	School 4 vs School 6	0.59	.75			1.51	.95		
Program	Academic vs. Cooperative	3.26^b	.68	0.037^b	0.096	1.06	.94	0.012^a	0.023
	General vs. Cooperative	1.57^a	.78			-2.86^b	1.07		
	Noncoopertive vs. Cooperative	-3.88^b	.82			2.12^a	1.08		
Residual class effects	Miscellaneous classroom effects (See figure D-2 for individual variables)	0.62^b	1.10	0.037^b	0.096	-2.22	1.51	0.047^b	0.090
		-1.47	1.29			1.00	1.79		
		-1.36	1.23			-1,47	1.59		
		-0.58	1.39			2.28	1.88		
		0.22^a	1.29			1.77	1.73		
		3.66^b	1.27			-0.89	1.71		
		-0.94^a	1.08			3.54^a	1.45		
		1.62	1.58			-2.83	2.05		
		0.44	1.28			0.15	1.64		
		2.78^b	1.04			1.57	1.33		
		0.79	1.51			-6.99^b	1.99		
		1.24	1.15			2.89	1.49		
		1.80	1.65			-1.43	2.54		
		0.34	1.20			1.11	1.61		
Other student characteristics	Perceived program	0.14^a	.75	0.030^b	0.078	-1.50	1.07	0.024	0.046
	Perceived program	1.57	.76			1.41	1.05		
	Expected educ. level	0.53	.30			0.02	.41		
	Current grades	0.89^b	.31			0.90^a	.41		
	Hours TV per day	0.25	.21			-0.22	.28		
	Part-time job--not school related	-0.52	.91			-1.42	1.25		

TABLE D-6--*Continued*

Effect	Independent Variables	Fall to Winter				Winter to Spring			
		b	Std. Err. b	R^2 Change	Rgrssd Change	b	Std. Err. b	R^2 Change	Rgrssd Change
Other student characteristics (continued)	Part-time job--84/85	-0.78	.92			1.86	1.27		
	Hours homework per week	0.01	.31			0.23	.42		
	School allows independent action	0.91[b]	.31			-0.26	.42		
	Leadership--extracurricular	0.03	.34			-0.82	.46		
	Participation--extracurricular	-0.27	.17			0.60[a]	.24		
	No. vocational courses	0.16	.27			-0.75[a]	.37		
	No. academic courses	0.09	.22			-0.01	.30		
				0.696	0.293			0.639	0.393

[a] $p < .05$, [b] $p < .01$

TABLE D-7

ADJUSTED CONTRAST AND CHANGE MEANS FOR READING ACHIEVEMENT BY PROGRAM CONTRASTS

	Fall to Winter		Winter to Spring	
Program Contrast	Adjusted Means	Adjusted Change Means	Adjusted Means	Adjusted Change Means
Academic	37.4374	2.5704	33.9765	-1.2205
Cooperative	33.1408	-1.4562	32.4150	-2.7820
All others (mean)	35.2891	0.4221	33.1940	-2.0030
General	35.1915	0.3245	30.1373	-5.0597
Cooperative	34.9236	0.0690	34.3388	-0.8582
All others (mean)	35.0576	0.1906	32.2381	-2.9589
Noncooperative	30.8578	-4.0092	34.8921	-0.3049
Cooperative	38.6220	3.7550	30.6389	-4.5581
All others (mean)	34.7399	-0.1271	32.7656	-2.4314

cooperative program. Examination of the adjusted change means showed that neither program effected a pronounced degree of change at this testing. Through contrast of the 2 vocational programs the students in the cooperative program achieved higher reading scores than did their counterparts in the noncooperative program ($b = -3.88$, $p < .05$). In this comparison, the adjusted mean for cooperative programs was 38.62, as opposed to that of 30.86 for the noncooperative program. Adjusted change means showed that the cooperative program students increased over 3.5 points, whereas the noncooperative students lost 4 points on reading achievement during the period in question.

Entry of the cluster of residual class effects into the model accounted for the same amount of regressed change as did the cluster for program effects, 10 percent. Again, the large amount of variance accounted for by this cluster suggests that design related considerations are producing as much, if not more, influence on achievement scores than are the other variables under study. Other student characteristics in the last cluster (see table D-3), accounted for about 8 percent of the residual variation and yielded 3 significant coefficients. The contrast of academic versus vocational for self-reported program produced a positive effect ($b = 0.14$, $p < .05$). This contrast indicates that students who reported themselves to be enrolled in academic programs, other factors being controlled, attained higher reading test scores at the winter testing. Self-reported school grades indicated that, at this testing, those students reporting higher grades also scored higher on the reading achievement test ($b = 0.89$, $p < .010$). Also important to explanation of reading achievement was the extent to which students perceived their school as fostering independent activity. Those students who felt that their school allowed them to function independently attained greater increases on the test under consideration ($b = 0.91$, $p < .01$).

Evaluation of Reading Achievement--Winter to Spring

In analyzing the winter to spring change in reading achievement scores, the first item of consideration was that covariation of the winter reading scores with those obtained in the spring explained far less of the variance than seen in the previous three analyses. Reading scores from the winter testing accounted for only 48 percent of the total variation in the dependent variable, spring reading achievement scores. This finding left 52 percent of the total variance to be regressed change. With the cluster of demographic variables having failed to produce any significant results, the analysis next turned to the school grade cluster. From the partial regression coefficient ($b = -3.22$, $p < .05$) it was concluded that 12th graders had not performed as well as 11th graders on the spring reading achievement test (see table D-6).

The cluster containing the confounding effects of school building removed 20 percent of the residual variation in this model. This finding strongly reinforced the importance of including such design-related variables in this analysis. Program contrasts, in total, explained just over 2 percent of regressed change. Although this amount was small, two of the three contrasts were statistically significant and the third conceptually significant in explaining change in the spring reading achievement scores. The contrast between academic and vocational cooperative programs was not significant in this analysis, leading to the implication that students in academic programs had not gained more from their program with respect to reading achievement than had students in the vocational cooperative program. A contrast between students in general programs and those in cooperative programs indicated that students in the latter program performed better than did their classmates did in the general education program ($b = -2.86$, $p < .010$). The adjusted mean for this general program, 30.13, represents over a 5 point decrease in reading achievement from the winter testing. However, the corresponding mean for the vocational cooperative program was stable with less than one point decrease. And in contrasting the two vocational programs, it was found that students enrolled in noncooperative programs exhibited higher spring reading achievement scores ($b = 2.12$, $p < .05$). Comparison of these 2 programs indicated that the adjusted mean for the noncooperative program, 34.89, represented little change from the winter testing; however, the adjusted mean for the cooperative program, 30.64, was the result of a 4.5 point decrease in reading achievement scores.

The cluster of residual class effects again removed a considerable amount, 9 percent, of the unexplained variation. Upon entry into the model, this last cluster of independent variables produced significant findings for current grades, extent of participation in extracurricular activities, and number of vocational courses taken. As in the analysis of the previous reading achievement, students who reported having higher grades experienced greater improvement in reading achievement scores ($b = .90$, $p < .05$). Students who reported participation in a greater number of extracurricular activities also experienced greater increases in their reading achievement scores ($b = .60$, $p < .05$).

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☆U.S.Government Printing Office: 1986 — 647-531/30002